

ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE.

EDITED BY

LEWIS S. PILCHER, A.M., M.D.,

OF BROOKLYN,

Professor of Clinical Surgery at the New York Post-Graduate Medical School;
Surgeon to the Methodist Episcopal Hospital.

J. WILLIAM WHITE, Ph.D., M.D.,

OF PHILADELPHIA,

Professor of Clinical Surgery, University
of Pennsylvania; Surgeon to the Univer-
sity and German Hospitals.

FREDERICK TREVES, F.R.C.S.,

OF LONDON,

Surgeon to and Lecturer on Anatomy at
the London Hospital.

AND

WILLIAM MACEWEN, M.D.,

OF GLASGOW,

Professor of Surgery in the University of Glasgow.

VOLUME XX.
JULY—DECEMBER, 1894.

PHILADELPHIA, PA. :
UNIVERSITY OF PENNSYLVANIA PRESS.
1894.

610.5

A6

S96

COPYRIGHT BY
UNIVERSITY OF PENNSYLVANIA PRESS,
1894.

PRINTED BY J. B. LIPPINCOTT COMPANY PHILADELPHIA U. S. A.

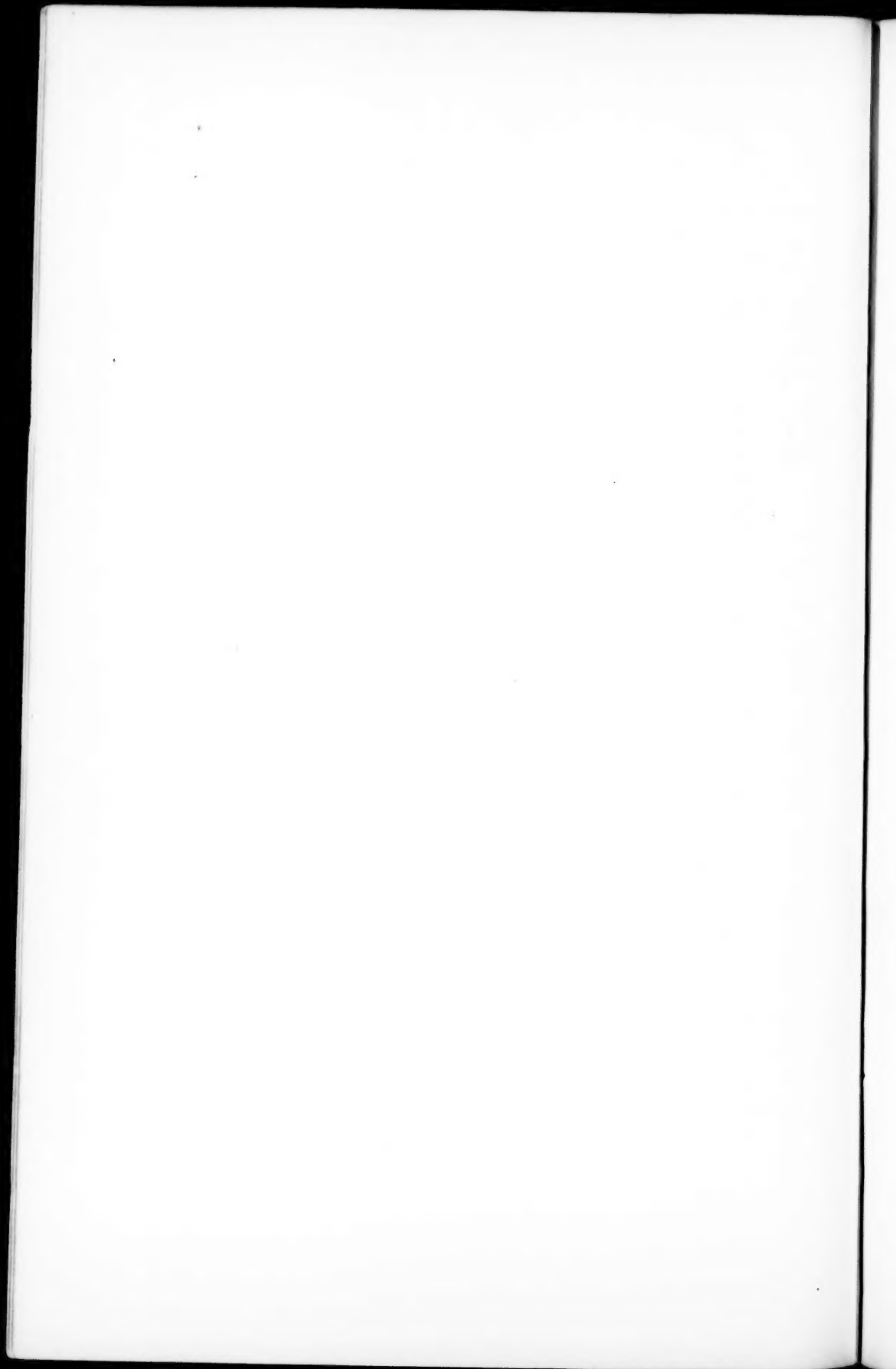
CONTRIBUTORS TO VOL. XX.

- J. F. BINNIE, C.M., OF KANSAS CITY, Surgeon to All Saints', the German, and the Children's Hospitals.
- C. J. BOND, F.R.C.S, OF LEICESTER, Surgeon to the Leicester Infirmary.
- E. H. BRADFORD, M.D., OF BOSTON, Surgeon to the Boston City, the Children's, and the Samaritan Hospitals.
- JOSEPH H. BRANHAM, M.D., OF BALTIMORE, Lecturer on Rectal Diseases in the College of Physicians and Surgeons.
- G. GORDON CAMPBELL, M.D., OF MONTREAL, Assistant Physician Montreal General Hospital.
- WILLIAM FRANCIS CAMPBELL, M.D., OF BROOKLYN.
- HENRY PELOUZE DE FOREST, M.D., OF BROOKLYN, Assistant Pathologist to the Methodist Episcopal Hospital.
- B. L. EASTMAN, M.D., OF BURLINGTON, KAN.
- CHRISTIAN FENGER, M.D., OF CHICAGO, Surgeon to the Emergency, the German, the Mercy, and the Norwegian Hospitals.
- V. P. GIBNEY, M.D., OF NEW YORK, Surgeon-in-chief to the Hospital for the Ruptured and Crippled.
- WILLIAM S. HALSTED, M.D., OF BALTIMORE, Professor of Surgery in the Johns Hopkins University.
- M. L. HARRIS, M.D., OF CHICAGO, Professor of Surgery in the Chicago Polyclinic.
- CHARLES MCBURNEY, M.D., OF NEW YORK, Surgeon to the Roosevelt Hospital.
- ANGELO MAFFUCCI, M.D., OF PISA, Professor of Pathological Anatomy in the University of Pisa.
- WILLIAM S. MAGILL, M.D., OF CHICAGO.

- A. H. MEISENBACH, M.D., OF ST. LOUIS, Professor of Surgery in the Marion Sims College of Medicine.
- WILLY MEYER, M.D., OF NEW YORK, Surgeon to the German and to the New York Skin and Cancer Hospital.
- T. HALSTED MYERS, M.D., OF NEW YORK, Orthopædic Surgeon to St. Luke's Hospital; Attending Surgeon to the New York Orthopædic Dispensary.
- RICHARD BARTLETT OLESON, M.D., OF CHICAGO, House Physician, Cook County Hospital.
- LEWIS S. PILCHER, M.D., OF BROOKLYN, Surgeon to the Methodist Episcopal Hospital.
- CHARLES T. POORE, M.D., OF NEW YORK, Surgeon to St. Mary's Free Hospital for Children.
- CHARLES A. POWERS, M.D., OF NEW YORK, Surgeon to St. Luke's Hospital, and to the New York Cancer Hospital.
- JOSEPH RANSOHOFF, M.D., F.R.C.S., OF CINCINNATI, Surgeon to the Cincinnati and Good Samaritan Hospitals.
- MAURICE H. RICHARDSON, M.D., OF BOSTON, Surgeon to the Massachusetts General Hospital.
- J. C. SCHAPPS, M.D., OF BROOKLYN, Orthopædic Surgeon to St. Mary's Hospital.
- F. FREMONT-SMITH, M.D., OF ST. AUGUSTINE, FLA.
- FREDERICK TREVES, F.R.C.S., OF LONDON, Surgeon to the London Hospital.
- JAMES P. WARBASSE, M.D., OF BROOKLYN, Assistant Surgeon to the Methodist Episcopal Hospital.
- GEORGE R. WHITE, M.D., OF NEW YORK.

AUTHORS OF WHOSE CONTRIBUTIONS TO RECENT SURGICAL
LITERATURE ABSTRACTS ARE PRESENTED.

-
- | | |
|--|---|
| <p>ALBERT, PROF., Vienna, 239
 BARTH, DR., Marburg, 612
 BASSINI, ED., Padua, 487
 BIER, DR., Kiel, 479
 BINAUD, DR., 244
 BRANDT, DR., Klausenburg, 484
 BRUNS, P., Tübingen, 617
 BULL, WILLIAM T., New York, 605
 BUTLIN, HENRY T., London, 231
 CONKLIN, W. J., Dayton, 483
 DAVIES-COLLEY, N., London, 228
 DEAN, HENRY P., London, 241
 DEMANS, DR., 244
 EIGENBRODT, DR., Bonn, 599
 GRIMM, F., Berlin, 616
 GURLT, DR., Berlin, 594
 HAECKEL, DR., Jena, 599
 HELPERICH, DR., Griefswald, 597, 617
 HENLE, DR., Breslau, 471
 HOFFA, DR., Würzburg, 741
 KAMMERER, F., New York, 682
 KELLY, HOWARD A., Baltimore, 248</p> | <p>KÜSTER, E., Marburg, 598
 LASSER, O., 592
 LESSER, DR., Halle, 615
 MESSNER, DR., Munich, 472
 MIDDLEDORFF, H., Hanan, 601
 PORTER, C. B., Boston, 611
 REGER, C., 474
 ROBITZSCH, DR., Leipzig, 246
 ROBSON, MAYO A. W., Leeds, 234, 606
 ROTTER, J., Berlin, 481
 SCHIMMELBUSCH, DR., Berlin, 470
 SCHLEICH, DR., Berlin, 477
 SENGER, EMIL, Krefeld, 476
 SONNENBURG, DR., Berlin, 595
 THOMAS, T. W., Liverpool, 485
 TILLMANN, H., Leipzig, 596
 VAN EISELSBERG, DR., Utrecht, 594
 WAGNER, W., Königshütte, 602
 WEIR, R. F., New York, 609, 610
 WOLFF, JULIUS, Berlin, 598
 ZELLER, DR., Berlin, 480</p> |
|--|---|



ANNALS OF SURGERY.

A STUDY OF ONE HUNDRED AND SEVENTY CASES OF CANCER.¹

By LEWIS S. PILCHER, M.D.,

OF BROOKLYN,

SURGEON TO THE METHODIST EPISCOPAL HOSPITAL.

IN the present communication I have attempted to present the facts pertaining to all the cases of cancer which have been admitted to the surgical wards of the Methodist Episcopal Hospital in Brooklyn from its opening in December, 1887, until October 31, 1893, the period covered being thus one of about six years.

My colleague on the surgical staff of this hospital, Dr. Fowler, has freely permitted me to include with my own cases those which have been under his care, so that this report therefore represents the work of the institution as a whole. In the collation of the cases, and especially in the very onerous labor of ascertaining the ultimate fate of patients who have been discharged from the hospital, I have received much valuable assistance from a number of gentlemen who have been former members of the house staff.

The diagnosis in all operated cases, with but few exceptions, has been confirmed by the minute examinations of the pathologists of the hospital, Drs. Hodenpyl and Belcher. In a very large proportion of the cases, unfortunately, the patients presented themselves at the hospital when the disease was already in so advanced a state of development that no minute

¹ Read before the New York Surgical Society, March 14, 1894.

examination by a pathologist could add any positiveness to the diagnosis.

By the term cancer, I mean those new growths which, after they have once begun their formation, steadily continue the accretion of their own peculiar tissue, invade and replace adjacent tissues, progress at their periphery while processes of necrosis cause the melting down of parts earlier developed, and, parasite-like, at the expense of the tissues among which they develop, continue their progressive invasions and necroses, unchecked by any resisting power in the normal tissues, either already inherent in it or that can be brought to it by any mode of living or of medication. To such growths the generic term of *cancer* has long been applied, and in my judgment it may well be retained as a general term to embrace the whole class of malignant neoplasms, as a clinical term equally applicable both to those growths which are of epithelial origin, the *carcinomata*, and to those which originate in the fixed tissue-cells, the *sarcomata*.

Classification.—Of the entire number of cases under observation, 136 belonged to the *carcinomata*, 34 to the *sarcomata*; 63 were males, 107 were females,—the preponderance of females being due to the large relative number of cases of carcinoma of the female breast and of the uterus. Of the *carcinomata*, 93 were females and 43 were males, a proportion of slightly more than 2 to 1; of the *sarcomata*, 14 were females and 20 were males, the preponderance as to sex being reversed, though in not so marked a disproportion as in the *carcinomata*.

Age.—Of the *carcinomata*, 5 cases were in patients between the ages of 20 and 30; 18 between 30 and 40; 33 between 40 and 50; 48 between 50 and 60; 26 between 60 and 70; 4 between 70 and 80, and 2 in persons who were 80 years of age or over; 83 per cent. of all being over 40 years of age.

Of the *sarcomata*, 5 cases were in patients less than 20 years of age; 3 between 20 and 30; 10 between 30 and 40; 6 between 40 and 50, and 10 50 years of age or over; the youngest being 1½ and the oldest 78 years of age; 53 per cent. of all were less than 40 years of age.

CARCINOMATA.

Following the classification as to regions of the body adopted for the surgical statistics of the hospital in general, the cases of carcinoma were distributed as follows: Group I, face, nose, and mouth, 19 cases; II, neck, 7 cases; III, breast, 31 cases; IV, abdomen, 17 cases; V, urinary organs, 5 cases; VI, male generative organs, 5 cases; VII, female generative organs, 34 cases; VIII, rectum, 16 cases; IX, extremities, 2 cases.

I. FACE, NOSE, AND MOUTH.

The first group, *face, nose, and mouth*, was made up of 4 cases of carcinoma of the nose; 2 of carcinoma of the cheek; 1 of the auricle; 2 of the lip; 2 of the tongue; 1 of the tonsil and pharynx; 1 of the naso-pharynx, and 6 of the lower jaw 19 in all.

All were subjected to operation, except one of extensive disease of the nose, in a man of sixty-four years of age, who declined operative treatment, and returned to his home, after a very brief stay in the hospital, unimproved.

In 2 cases of limited carcinoma of the skin upon the side of the nose, wide extirpation, followed by covering in of the defect by a plastic operation, was done with success. Only eight months, however, have elapsed since the operations, so that the ultimate benefit from treatment cannot be yet determined. A third similar case, in a man of eighty-two years, remained free from recurrence until his death from other disease eighteen months later.

Of the 2 cases of carcinoma of the cheek, 1, a woman of fifty-six years, is a recent case, in which, after wide extirpation involving the whole thickness of cheek, immediate union has been secured. The second case, a man of sixty-nine years, was subjected not only to extirpation of the cheek, but also of the corresponding half of the lower jaw on account of the apparent involvement of its periosteum in the growth. Prompt recovery followed, and he remained free from recurrence at this point during the remainder of his life, a period of four years. After four years, however, he

developed carcinoma of the testicle, with involvement of the pelvic glands, from which he died a few weeks after an operation for the removal of the affected testicle.

In the case of epithelioma of the auricle, free extirpation of all the affected tissue, with an abundant zone of sound tissue, was done in a woman aged sixty years. At the present date, fifteen months after operation, there is no sign of recurrence.

The cases of lip cancer were both in men sixty-six years of age. Of one case no subsequent history had been obtained. In the other there is no recurrence, two years having now elapsed.

The tongue cancers were both in men, one sixty-two, and the other eighty years of age. In both the organ was extensively affected, and the adjacent cervical glands were involved. In the younger of the two the floor of the mouth was also involved. In both extirpation of the diseased tissues of the mouth and neck was done after preliminary ligation of the lingual arteries. Both bore the immediate operation well. Every care in the subsequent treatment was given to them for drainage and disinfection of the mouth, but both developed septic pneumonia, presumably from food infection, the younger on the tenth day, the elder on the fifth day after the operation, resulting in death within forty-eight hours thereafter.

The case of carcinoma of the tonsil and pharynx was in the person of a woman, forty years of age. The disease had begun as a primary affection of the left tonsil, but at the end of a year, when she entered the hospital, the adjacent tissues of the pharynx and soft palate and the cervical glands had become involved. The removal of the affected parts demanded an extensive dissection of the neck, floor of the mouth, palate, and pharyngeal wall, with division of the body of the lower jaw, and ligation of both the external and internal carotids and excision of a portion of the internal jugular vein of the affected side, and a final tracheotomy to insure a supply of pure air to the lungs. Much blood was unavoidably lost, but the chief symptoms displayed at the close of the operation were caused by the interference with the cerebral circulation, as manifested by coma, Cheyne-Stokes respiration,

and right-sided paralysis, which symptoms persisted until death supervened at the end of fifty hours.

The case of carcinoma of the naso-pharynx was in the person of a male, forty years of age, in whom the symptoms of intra-nasal growth had been present for about one year. When admitted the naso-pharyngeal space was filled with the growth, which had also spread into the left pharyngeal wall. An incomplete removal was effected, after longitudinal division of the floor of the nose and roof of the mouth and alveolar process by saw, forceps, and knife had been done, and the bones of the face had been forcibly separated so as to permit of more ready access to the growth. Rapid recurrence of the growth followed, with death within six months.

The cases of carcinoma of the lower jaw were all in men, aged respectively fifty-one, fifty-one, fifty-three, fifty-six, fifty-six, and fifty-six years. In three of them the involvement of the lower jaw was secondary, the disease having originated either in the lip (two cases) or in the skin of the chin (one case). In all of these there was extensive infiltration of the adjacent soft tissues of the neck and of the cervical glands. In none of these was anything more than partial removal attempted. In all three the disease progressed to death within a few months. In the remaining three cases the disease developed primarily in the lower jaw itself, but in all the cervical glands were already extensively affected. In all these removal of all the affected tissue was attempted by operation. In one the entire left half of the lower jaw, together with a portion of the right side, as far as the site of the bicuspid teeth, was taken away, also the entire left half of the floor of the mouth, entire left half of the pharynx, and much of the tissues of the upper triangle of the neck. The carotids were preserved, but an inch and a half of the internal jugular was excised. The supports of the tongue having been so largely removed, tracheotomy was done to facilitate respiration. The patient rallied well, and was apparently progressing towards recovery when, during the night of the eighth day, a secondary hæmorrhage occurred which resulted in death.

In the second case the left half of the lower jaw and the

affected cervical glands were extirpated. The internal jugular vein was found involved in the growth and thrombosed. Between one and two inches of it were excised. The man made a rapid and uncomplicated recovery. Within a few weeks after his return home he began to manifest symptoms of pressure within the orbit and the spheno-maxillary fossa of the affected side, which rapidly increased, with meningeal additions, and continued to advance until death resulted three months after the hospital operation. The manner of the metastasis, which took place in this case, may be a matter of speculation. I am inclined to the theory that it was through the regurgitant venous current from the thrombosed jugular vein; the detachment of the infective emboli may very easily have been caused by the manipulations of the vein at the time of the operation. It is equally possible that the metastasis may have already taken place before his admission to the hospital.

In the third case a partial removal of the lower jaw had been done in another state nine months before, and a mass of glands had been removed six months thereafter. He was admitted with recurrence in the ramus of the jaw that had been left at the first operation. He submitted to extirpation of this, with immediate operative recovery, only to rapidly develop a glandular growth at the base of the neck. This was extirpated, and was followed by death from shock and progressive asthenia on the fifth day thereafter.

GROUP SUMMARY.

Carcinomata of Face, Nose, and Mouth.

Total number of cases 19

<i>Character of Treatment.</i>		<i>Results.</i>	
No operation	1	Subsequent history unknown	1
Incomplete extirpation	3	Death within six months	3
Radical extirpation	15	Died from operation	5
		Speedy recurrence, with death within one year	2
		No local recurrence; death after four years from similar disease in a distant organ	1

<i>Character of Treatment.</i>	<i>Results.</i>
	No recurrence during rest of life, eighteen months 1
	No recurrence to date, fifteen months and two years respectively, and three cases eight months each 5
	Subsequent history unknown 1
Total	19
	Total 19

NECK.

The region of the *neck* presents seven cases, classifiable as follows :

Deep tissues of the neck and pharynx	2
Larynx	2
Esophagus	3
Total	7

The two cases in which the growth infiltrated diffusely the deeper tissues of the neck, involving the wall of the pharynx, were considered inoperable and were discharged unimproved. Their further history is unknown.

In the two cases of laryngeal cancer, complete laryngectomy was done in both instances, except that in one the posterior portion of the wings of the thyroid was left to preserve the attachments of the pharyngeal constrictors.

Both patients recovered satisfactorily from the operation. One, a woman, fifty-eight years of age at the time of operation, lived for three years and three months, when she died from local recurrence. The second patient, a man fifty-six years of age, speedily displayed recurrent disease, with metastasis, and died at the end of four months.

Of the cases of œsophageal disease, one was discharged untreated, subsequent history unknown. One died from intercurrent pulmonary disease due to infection from the necrotic and infective processes in the growth, and one was subjected to gastrostomy, but died at the end of forty-eight hours, from progressive pre-existing asthenia.

GROUP SUMMARY.

Carcinomata of the Neck.

Total number of cases 7

<i>Character of Treatment.</i>		<i>Results.</i>	
No operation	4	Subsequent history unknown	4
Palliative operation :	1	Died from pre-operative exhaustion in forty-eight hours	1
Radical extirpation	2	Recurrence, with death at end of six and thirty-nine months respectively .	2
Total	7	Total	7

BREAST.

There were thirty-one women admitted on account of mammary carcinomas: of these three were already unmistakably inoperable, and the disease was permitted to progress to its fatal termination without surgical interference. One operable case refused operation; her after history is unknown. The remaining twenty-seven women were subjected to operation for radical extirpation of the growth. The operations in all these cases were extensive in the amount of tissue removed. In all a systematic removal of the axillary glands and fat was done. Wide areas of skin were removed, and large portions of the pectoral muscles were in many of the cases excised. Upon eight patients subsequent operations were also done for the removal of recurrent growths, in two of which the remaining breast required removal for disease developing within it after primary operation upon the opposite gland.

Of the twenty-seven individuals operated upon, the later history of two is unknown. One returned at the end of three months with recurrence in the cicatrix, and after a second extirpation was discharged and has not been since heard from.

In ten other cases there was speedy recurrence *in loco*, indicating the incompleteness of the primary operation, with steady progress thereafter to death, which occurred at periods varying from six months to two and a half years after the primary operation, six of them being within one year.

In two cases there was recurrence in the axilla at periods

of two and a half and three years respectively after operation. These patients are still living, but no further operation is contemplated in their cases.

In four cases there has been no recurrence *in loco*, but there has been a later development of thoracic and abdominal growths, with death after two and a quarter, three, and four years respectively.

Eight patients remain well to date, at periods respectively of ten months, sixteen months, twenty-two months, twenty-two months, three years, three years, three years and six months, and three years and eight months after operation. In two of these cases it is to be noted, however, that a second interference was required to destroy a limited focus of disease in the sternal attachment of the great pectoral muscle. This having been done, no further development of disease has appeared.

One patient remained well when last heard from, in September, 1892, fifteen months after operation.

GROUP SUMMARY.

Carcinoma of the Breast.

Total number of cases 31

<i>Character of Treatment.</i>		<i>Results.</i>	
No operation	4	Unknown	1
		Death within a few months	3
Radical extirpation	27	Unknown	2
		Early recurrence <i>in loco</i> ; second operation; after history unknown	1
		Early recurrence <i>in loco</i> ; terminating in death, after periods varying from one-half to two and a half years	10
		Later recurrence in axilla, after two and a half and three years; patients still living, but disease progressing	2
		No recurrence <i>in loco</i> ; death from internal metastasis, after one, two and a quarter, three, and four years respectively	4
		Remain well to date, after ten, sixteen, twenty-two, and twenty-two months, three, three, three and a half, and three and two-third years respectively	8
Total	31	Total	31

ABDOMEN.

Of carcinoma of the abdominal viscera, seventeen cases have come under our care, as follows :

Stomach	1
Colon	8
Omentum	1
Pancreas	1
Liver	5
Gall-bladder	1
Total	17

Temporary relief was afforded to the case of gastric carcinoma by a gastro-jejunostomy. Death from asthenia, however, resulted at end of two months.

The cases of disease of the colon were all brought to the hospital for the relief of obstruction to the bowels, most of them in a condition of profound prostration, and without any clue as to the cause of the obstruction. In seven instances an exploratory incision having revealed the character of the obstruction, colostomy was done for its relief. Four of these nevertheless continued to sink, and died within twenty-four hours from the pre-existing exhaustion. The remaining three rallied, and their lives were prolonged, one for two months, and two for about one year each. In the remaining case a right inguinal colostomy was at once made, with relief to the obstruction and temporary improvement in general state. Her subsequent history is unknown.

In the case of *omental carcinoma* an explorative abdominal section was done, only to reveal such diffusion of the growth with invasion of multiple adjacent viscera as to make it inoperable. A post-operative nephritis caused death three days thereafter.

The case of *carcinoma of the pancreas* was admitted on account of obstruction of the bowels. Immediate enterostomy was done; death from return of the obstructive symptoms followed on the twelfth day thereafter. Autopsy revealed carcinoma of pancreas, ileum, and colon.

Five cases of *carcinoma of the liver* were admitted. Three of these were plainly metastatic in origin, and no surgical inter-

ference was attempted. In one of the remaining two an explorative abdominal incision was made, but without benefit other than to confirm the diagnosis. Four of these were kept under observation until their death, after a few weeks. One was discharged, and her subsequent history has not been ascertained.

The *gall-bladder* case was subjected to cholecystotomy for calculi. The distended, thickened, and adherent organ bled profusely during the operation, and after reaction again bled to the degree of fatal anæmia despite saline intravenous infusion. Subsequent examination showed the case to be one of primary carcinoma of the gall-bladder.

GROUP SUMMARY.

Carcinomata of Abdominal Viscera.

Total number of cases		17
<i>Character of Treatment.</i>		<i>Results.</i>
No operation	4	Died within a short time from the unchecked progress of the disease 3
		Subsequent history unknown 1
Palliative operation	10	Death quickly following operation and hastened by it 4
		Death from natural progress of disease at end of twelve days 1
		In two months 2
		In one year 2
		Subsequent history unknown 1
Incomplete extirpation	3	Death quickly following operation and hastened by it 3
Total	17	Total 17

URINARY ORGANS.

Five cases of carcinoma of the urinary organs have been treated, including one case involving the kidney, and four the bladder.

The case of carcinoma of the kidney was in the person of a woman, fifty-three years of age, who was admitted to the hospital with a large tumor filling the right half of the abdomen. An explorative section through the abdominal wall over the most prominent part of the tumor revealed a growth springing from

the right kidney and involving the superjacent colon and mesentery. It was deemed inoperable and the wound closed. The growth steadily advanced, became necrotic, breaking down the cicatrix of the abdominal wound, and establishing a fistula into the bowel, terminating fatally by asthenia at the end of three and a half months.

The four cases of carcinoma of the bladder were all submitted to perineal cystotomy and curettement. One case died at end of one week, one at end of three weeks, and in two life was prolonged for one year.

GROUP SUMMARY.

Carcinoma of Urinary Organs.

Total number of cases		5	
<i>Character of Treatment.</i>		<i>Results.</i>	
Incomplete operation	5	Temporary relief to symptoms, subsequent death from the disease in one week	1
		In three weeks	1
		In three and a half months	1
		In twelve months	2
Total	5	Total	5

MALE GENERATIVE ORGANS.

This group includes two cases of carcinoma testis, and three of carcinoma penis.

In one case both testicles were alike diseased, and both were extirpated, together with adjacent enlarged inguinal glands. No benefit resulted from the operation, on account of already present metastatic disease of the abdominal viscera, from which death resulted at end of two months.

In a second case, only one testicle being affected, it was removed, and the patient discharged apparently cured. He died at his home eleven months after the operation from intra-abdominal metastasis.

One case of epithelioma of glans and prepuce refused treatment; after-history is unknown. One case of epithelioma at

base of penis, with enlarged glands in both groins was submitted to wide extirpation of the ulcer and of the affected glands. Recovered from operation, but steadily sank thereafter, and died within a few weeks with symptoms of metastasis in abdominal viscera. In the third case, one of extensive disease of the body of the penis, with enlarged glands in both groins, the penis was amputated close to the pubis, and the affected glands thoroughly removed. After-history: no recurrence to date, a period of one year having elapsed.

GROUP SUMMARY.

Carcinoma of Male Generative Organs.

Total number of cases		5
<i>Character of Treatment.</i>		<i>Results.</i>
No operation	1	Subsequent history unknown 1
Incomplete extirpation	2	Death from progressive disease within a few weeks 2
Radical extirpation	2	Free from recurrence at end of one year 1
		Died within one year from intra-abdom- inal metastasis 1
Total	5	Total 5

FEMALE GENERATIVE ORGANS.

Of this group there presented 2 cases of disease of the labia, 3 of the vagina, 24 of the uterus, and 5 of the ovaries,—34 in all.

The two cases of labial disease were subjected to wide extirpation. Rapid recovery ensued in both. One remained free from disease for three and a half years, when a recurrence began which has been neglected until now, at the end of eighteen months more, it has widely infiltrated the vagina, perineum, and buttocks, and is inoperable.

The second case still remains free from disease at the present date, two years after operation, and is leading an active life.

The three cases of vaginal carcinoma were each already complicated by such extensive involvement of the adjacent bladder and rectal walls as to be clearly inoperable. In two of them no interference was attempted; in one a partial excision was done. All subsequently terminated in death within a few months. Of the twenty-four cases of carcinoma uteri, seventeen were already clearly beyond the possibilities of radical extirpation by reason

of involvement of adjacent organs, extension into broad ligaments, or metastases in internal viscera. Of these, seven for various reasons were submitted to no treatment, and were discharged unimproved, after a brief stay in the hospital; one was admitted—in *extremis*—for operation for relief of intestinal obstruction due to the pressure of the pelvic tumor, was submitted to lumbar colostomy, and died from the shock of the operation; the remaining nine were subjected to curettement and packing with caustic tampons of chloride of zinc. One of these patients died suddenly some hours after the operation with symptoms of cardiac embolism. The others, numbering eight, were all temporarily improved, and in that condition were discharged from the hospital. The after-histories of these patients, who were either untreated or only palliatively treated, have not been ascertained. Their termination in death within a year in all of them is certain.

Of the entire number in only seven was there any encouragement to attempt radical extirpation, and a rigid standard of selection would, perhaps, have properly excluded a majority of these. In one case the carcinomatous uterus and much peri-uterine infiltrated tissue was removed through an abdominal incision. Death ensued on the fourth day thereafter from intestinal paresis and consequent obstruction, without sign of peritonitis or nephritis. Six cases were subjected to vaginal hysterectomy. All made satisfactory and prompt recoveries from the operation. In four of these cases recurrence speedily declared itself either within the pelvis or the abdomen, one dying within four months, and three within twelve months, after the operation. In the two remaining cases no recurrence has as yet manifested itself, at the end of two years in one case and eight months in the other.

Of the five cases of carcinoma of the ovaries in three the condition was already inoperable, by reason of the extent to which adjacent tissues and organs had become involved. Two of these were subjected to no surgical interference; in the third case an exploratory abdominal incision was made, and a large quantity of ascitic fluid evacuated, to the temporary relief of the patient. The after-history of these cases has not been ascertained. Death within a few months was certain. In the fourth

case, a girl of twenty-five years, there was a large tumor of the ovary extending above the umbilicus, densely adherent over its upper surface to the anterior parietal wall of the abdomen, and with other adhesions to the omentum. It was removed without special difficulty, and the patient made a smooth recovery. At the end of one year a nodular infiltration of the wall of the abdomen, over the site of the former adhesions, had become perceptible. This slowly increased, while axillary, cervical, and thoracic glandular enlargements developed, terminating in death by asthenia three and a half years after the removal of the ovary. In the fifth case the primary growth had been removed at another hospital some two years before. When she presented herself to us there were multiple secondary growths in the abdomen, and marked glandular enlargements in thorax and neck. She was much prostrated and lived but a few days after admission, no surgical interference having been done.

GROUP SUMMARY.

Carcinoma of Female Generative Organs.

Total number of cases 34

*Character of Treatment.**Results.*

No operation	12	In all unchecked progress of the disease, in one, death within a few days, in the remainder, death within a year probable, but not ascertained . . .	12
Palliative operation	2	Death from shock of operation . . .	1
		Temporary relief to symptoms; disease unchecked	1
Incomplete extirpation	10	Operative death from cardiac embolism . . .	1
		Temporary relief to symptoms; ultimate death from progressive disease . . .	9
Radical extirpation	10	Operative death from intestinal paresis . . .	1
		Speedy recurrence and death within one year	4
		Recurrence at end of one year; death at end of three and a half years . . .	1
		Recurrence at end of three and a half years; still living, but inoperable at time of report	1
		Well after eight months	1
		Well after two years	2
Total	34	Total	34

RECTUM.

The cases of rectal carcinoma numbered sixteen : of these seven were situated at some point between the sigmoid flexure and the lower three inches of the rectum, being properly called "high-lying"; and nine involved more or less of the lower three inches of the rectum; to these latter I give the term carcinoma of the outlet of the rectum.

Of the "high-lying" growths, in two operative relief was declined, and the patients were discharged without further treatment. One of these is known to have died at his home about eighteen months later; the after-history of the second is unknown. Three patients were admitted on account of more or less complete obstruction of the bowels, with growths widely infiltrating the pelvic tissues. They were all submitted to immediate colostomy. One of them was relieved, rallied from her existing exhaustion, and was discharged with a permanent artificial anus. Her after-history is unknown. A second case did not rally from her pre-operative collapse, but died from asthenia within twenty-four hours after admission. The third case died on the fifth day after operation from renal suppression. In the two remaining cases an attempt at radical extirpation was made access to the growth being afforded by excision of the coccyx and lower lateral segment of the sacrum. In one of these cases the growth was found to so widely infiltrate the tissues of the pelvis as to make its entire removal impracticable. The diseased segment of the rectum was removed and further operative effort desisted from. The operative anæmia and shock was great, and determined death forty hours afterwards. In the remaining case the diseased segment of the rectum was enucleated and excised and the upper part of the gut brought down and stitched to the lower part. Several enlarged post-rectal glands were also removed. The patient, a man of sixty-one years, reacted slowly; then gradually sank and died by asthenia on the fourth day after the operation.

Of the nine cases of growth at the outlet of the rectum three were plainly inoperable when admitted; two of these returned home after a brief stay in the hospital with evidently but a

few weeks to live; the third patient was submitted to an inguinal colostomy which afforded much relief, her life being prolonged for seven months.

In the remaining six patients radical extirpation of the diseased tissues was done; all made uninterrupted recoveries from the operation. Of these no subsequent information has been received in two cases; local recurrence manifested itself in a short time in one case with death by exhaustion within one year from the operation, in a second case the local recurrence became manifest at the end of a year, and was not arrested by a second operation, but terminated in death in about two years after the primary operation; yet another case died at the end of eighteen months from recurrent disease, the exact locality of which is unknown, and the last case died one year after operation from abdominal cancer.

GROUP SUMMARY.

Carcinoma of Rectum.

Total number of cases		16
<i>Character of Treatment.</i>		<i>Results.</i>
No operation	4	Further history unknown 3
		Death after eighteen months 1
Palliative operation	4	Death from operation 1
		Death from pre-existing exhaustion . . 1
		Temporary relief, ultimate death, date unknown 1
		At end of seven months 1
Incomplete extirpation	1	Death from operation 1
Radical extirpation	7	Death from operation 1
		Further history unknown 2
		Speedy recurrence <i>in loco</i> . Death after six, eighteen, and twenty-four months respectively 3
		No recurrence <i>in loco</i> . Death from abdominal metastases after one year 1
Total		16
		Total 16

THE EXTREMITIES.

Only two cases of carcinoma of an extremity have come under observation; one a limited epithelioma, seated upon the back of the hand of a woman sixty years of age, was widely excised. The further history of the case is unknown.

The second, an epithelioma of the hand in a woman seventy-four years of age, had been already operated upon elsewhere three times, at intervals of about six months each time. She now presented herself with enlarged epitrochlear and axillary glands, and with evident metastatic deposits in the liver. The condition was inoperable, and death by asthenia occurred in about three months thereafter.

GROUP SUMMARY.

Carcinoma of the Extremities.

Total number of cases		2	
<i>Character of Treatment.</i>		<i>Results.</i>	
No surgical treatment	1	Death after three months	1
Radical extirpation	1	After-history unknown	1
<hr/>		<hr/>	
Total	2	Total	2

SARCOMATA.

The cases of sarcoma that have come under our observation have been thirty-four in number, originating as follows: one in the brain, seven in lymph-glands, six in secretory glands, thirteen in bones, and seven in intermuscular or superficial connective tissue.

BRAIN.

The brain tumor occurred in the person of a man, thirty-four years of age, who was admitted with well-marked symptoms of brain tumor, which had developed subsequent to an injury to the head sustained six years previously. The localizing symptoms were very indefinite. The indications for relief were urgent, and it was deemed justifiable to make an exploratory invasion of the part of the brain in the left parieto-occipital region, at which point the cicatrix of the previous injury was distinct. No tumor was found here, however, and the patient died at the end of thirty-eight hours thereafter, from the shock of the operation. The autopsy revealed a colossal glioma of the anterior half of the left hemisphere of the cerebrum.

GROUP SUMMARY.

Sarcoma of Brain.

One case.

<i>Character of Treatment.</i>	<i>Result.</i>
Explorative operation 1	Death from operation 1

LYMPH-GLANDS.

In this group are included two cases originating in the pre-auricular lymph-gland, four in the cervical glands, and one in the axillary glands. In one of these the already present marked evidences of extensive disease in the thorax showed the case to be plainly inoperative, and no surgical interference was attempted. The after-history of the case is unknown.

In a second case a similar condition should have negated any interference, but at the earnest solicitation of the patient all the cervical growths were removed; death from the intrathoracic disease occurred at the end of four months thereafter.

In two cases, one of the axilla and one of the neck, thorough extirpation of the diseased masses was done; followed in the first case by the appearance of enlargements, both *in loco* and in various other regions of the body within a few months, and death by asthenia within a year, and in the second case no recurrence to date, three months having elapsed.

In a third case, a cervical growth, radical extirpation was performed, but the after-history is unknown.

The two cases of sarcoma of the pre-auricular lymph-gland were both subjected to radical extirpation. Of one case the after-history is unknown; of the second, there is no recurrence till the present date, a period of one year.

GROUP SUMMARY.

Sarcomata of Lymph-Glands.

Total number of cases		7		
<i>Character of Treatment.</i>		<i>Results.</i>		
No operation	1	After-history unknown	1	
Incomplete extirpation	1	Death after four months	1	
Radical extirpation	5	Speedy recurrence both <i>in loco</i> and at a distance, with death	1	
		No recurrence to date, one year	2	
		After-history unknown	2	
Total		7	Total	7

SECRETORY GLANDS.

In this group are six cases, made up of one of the parotid gland, one of the prostate, and four of the testicle.

The tumor of the parotid had already invaded the adjacent structures of the jaw and neck. An incomplete extirpation was done for the relief of pain. The uninterrupted advance of the disease resulted in death within a few months.

The tumor of the prostate was in the case of a man, seventy-eight years of age, who was admitted in a moribund condition. No operation was done. The patient died within twenty-four hours.

The cases of disease of the testicle all occurred in comparatively young men, the oldest patient having been forty-two years of age, the youngest nineteen. All applied for relief early in the history of the disease. All were submitted to radical extirpation, but the after-history of none has been ascertained.

GROUP SUMMARY.

Sarcomata of Secretory Glands.

Total number of cases		6
<i>Character of Treatment.</i>		<i>Results.</i>
No operation	1	Death within twenty-four hours 1
Incomplete extirpation	1	Death within a few months 1
Radical extirpation	4	After-history unknown 4
Total	6	Total 6

BONES.

Of 13 patients affected with sarcoma of bone, which have been under observation, the disease originated in the frontal bone in 1 case; in the superior maxilla in 2 cases; in the inferior maxilla in 1 case; in the humerus in 1 case; in the ribs in 1 case; in the ischium in 1 case; in the femur in 4 cases; and lastly in the tibia in 2 cases.

In the case of frontal bone-disease, secondary growths in the clavicle and one rib had already developed before admission. All three growths were freely excised. Immediate recurrence at each site followed, with final death after five months.

In the cases of upper-jaw disease, in 1 nothing but a pallia-

tive curettement was attempted. The unchecked disease ended in death within the year. In the second case a total extirpation of the affected bone was done. There followed, however, immediate recurrence *in loco*. Injections of erysipelatous toxines were then instituted, but after a few injections without positive results the patient declined further treatment. His present condition is unknown.

For the sarcoma of the lower jaw, total extirpation of the right half of the bone was done. The recovery from the operation was smooth, but speedy recurrence *in loco* followed, with death within a few months thereafter.

The sarcoma of the humerus developed at the site of a fracture sustained three years previously. Three months previous to admission, spontaneous fracture from muscular action occurred at the site of original fracture. Exploratory incision revealed sarcomatous degeneration, a diagnosis which was later confirmed by the pathologist. Amputation at the shoulder-joint was done. Eighteen months later patient remained well.

The sarcoma of the ribs was in the person of a woman, fifty-four years of age. When she came under observation there was a very large growth springing from the right lateral wall of the thorax behind the breast, which gland was lifted up by it and was not involved. When exposed during operation the growth was found to involve the periosteum of the third, fourth, fifth, and sixth ribs, and the corresponding intercostal soft tissues. It was peeled away as completely as possible. The patient made a smooth recovery, and has ever since pursued her calling as a stewardess on an ocean steamship. No external recurrence has developed, but there are now well-marked evidences of intrathoracic and abdominal growths.

The sarcoma of the ischium occurred in a child, eighteen months of age. The growth, springing from the internal surface of the left ischium, extended to the sacrum, and formed a mass which nearly filled the cavity of the pelvis and extended upward above the pelvic brim. Obstruction to the passage of feces had resulted, which symptom was the immediate cause of application for relief. Inguinal colostomy was advised, but declined by the parents of the infant. The child died at home, unrelieved, within a few days.

Of the 4 cases of sarcoma of the femur, in one, a woman of forty-six years of age, the case had been supposed to be one of tuberculosis at the knee, and in the course of operation for excision its true nature was first revealed. Amputation through the middle of the femur was at once substituted for the excision, with the idea of the removal of the entire bone at the hip later, after the consent of the patient had been obtained. But the patient died within forty-eight hours from the operative shock.

The remaining three cases were all submitted to amputation at the hip-joint. All recovered smoothly from the operation. One remains well to date, two years after operation; the remaining two soon developed abdominal and thoracic metastases, and died within a few months.

Of the two cases of sarcoma of tibia, both were at once amputated at the knee-joint. In one case recurrence in the stump followed within a few months, with later thoracic metastasis and death in about one year after the primary operation. In the other case the patient remained free from recurrence till her death from other disease, two and a half years later.

GROUP SUMMARY.

Sarcomata originating in Bone.

Total number of cases		13
<i>Character of Treatment.</i>		<i>Results.</i>
Incomplete extirpation of affected bone	6	Death from operation 1
		Immediate recurrence <i>in loco</i> , with ultimate death 4
		In good health three years; ultimate recurrence in thoracic and abdominal viscera 1
Complete extirpation of affected bone	6	Remaining well to date. At periods of one and a half to two years respectively 2
		Remained free from recurrence during rest of life, two and a half years . . . 1
		Speedy metastatic recurrence, with ultimate death 3
No operation	1	Death 1
Total	13	Total 13

SKIN AND INTERMUSCULAR CONNECTIVE TISSUE.

The skin or intermuscular connective tissue was the site of disease in 7 instances. Of these, 2 were located upon the fingers, 3 upon the thigh, 1 in the gluteal region, and 1 in the bladder.

The two finger cases and two of the thigh cases were superficial, and were readily excised with an abundant zone of sound tissue.

The later history of these cases is unknown, except in one of the finger cases, in which the little and ring finger and the corresponding portion of the hand were amputated on account of sarcoma arising upon the little finger. No local recurrence has since taken place, one year and a half having elapsed, but a recurrence at the elbow is reported to be present.

In the third thigh case the growth sprang from the sheath of the vessels in Hunter's canal, and formed an ovoid tumor of about five inches longest diameter in the inner side of the thigh. It was well encapsulated, and was enucleated and excised. At the end of a year the patient reported himself as well. Shortly thereafter a new growth was detected *in loco*. Six months later the patient presented himself for renewed operative treatment, the recurrent growth widely infiltrating the tissues of the thigh. Amputation at the hip-joint was done, with clean excision of all the soft tissues in the inside of the thigh from their pelvic insertions. Death ensued within twenty-four hours from the shock of the operation.

The gluteal growth was a large mass infiltrating the left gluteal region. It was thoroughly extirpated. No subsequent recurrence *in loco* occurred, but death supervened two months later from abdominal metastasis.

The bladder sarcoma was subjected to curettement through a perineal incision, with relief to the immediately pressing bladder symptoms. Death by asthenia four months later followed.

GROUP SUMMARY.

Sarcomata originating in Skin and Intermuscular Connective Tissue.

Total number of cases 7

<i>Character of Treatment.</i>		<i>Results.</i>	
Incomplete extirpation	1	Death after four months	1
Radical extirpation	6	After-history unknown	3
		No recurrence <i>in loco</i> ; recurrence in distant parts	2
		Recurrence <i>in loco</i> ; death from secondary operation	1
Total		Total	
	7		7

RÉSUMÉ.

From the data given above it appears that out of the 136 cases of carcinomata that presented themselves in the surgical service of this hospital during a brief period considerably more than one-half—namely, 72—were already unquestionably beyond the possibility of successful surgical relief. In 31 of these cases no operative interference was attempted; in 17 of them palliative operations, such as gastrostomy, enterostomy, colostomy, and paracentesis abdominis, were indicated and were performed, and in the remaining 24 incomplete extirpations, consisting of curettings and cauterizations, were done for temporary relief of symptoms. So profound was the depression and exhaustion, already present in many of these cases, that a considerable mortality attached directly to these palliative and incomplete operations, since there were eleven operative deaths following upon the 41 operations of this character performed.

In the cases of 64 of the patients, however, the promise of possible radical extirpation was sufficiently great to justify the attempt. These attempts were always planned so as to carry the excision through sound tissues as widely from the disease as respect to important functions and to life would permit.

In seven instances death was the direct result of these operative attempts. The later history of six of the patients who recovered from operation has not been ascertained, leaving thus 51 individuals to illustrate the value or the futility of these

attempts at radical extirpation. Of these in 22 the speedy reappearance of the disease in the operated region proved its previous diffusion beyond the tissues removed by the knife, while in six more, without reappearance *in loco*, the steady development of metastatic growths in internal viscera proved that the hopes that had been entertained as to possible radical extirpation had been erroneous.

Conscious as I am of the thoroughness and extensiveness of the efforts which were made in all these cases to eradicate the disease, I feel that I am justified by the event in classifying them as cases that came too late to the operating-table, belonging properly to the same class as those that when first seen were frankly inoperable. Many of these cases were subjected to second, some even to third and fourth operations. But the ultimate appearance of internal metastases ushered in the fatal event in them all. Such a record, black and forbidding as it is, simply serves to anew emphasize the teaching that to temporize and to delay with growths that may possibly be carcinomatous is in the highest degree dangerous and culpable. Such delay is in many instances the fault of the patients, who refuse to admit to themselves the possibility of the development of cancer in their persons, but much more frequently it is the fault of physicians who seek to allay the fears of patients by assurances of the insignificant nature of the "lump" or the sore for which they seek advice.

Twenty-three patients yet remain to be accounted for. Of these, after periods of immunity varying from one to three years, carcinoma reappeared in the region originally affected in four cases; in one case it reappeared in a distant part of the body, and in eighteen cases there has as yet appeared no recurrence. The periods which have elapsed in these so far cured cases are yet too brief for forming any opinion as to the ultimate result in them, being 3 years and over in 4 cases; between 2 and 3 years, 3 cases; between 1 and 2 years, 6 cases; 10 months, 1 case; and 8 months, 4 cases.

The records of the cases of sarcomata are quite parallel with those of the carcinomata. Of the thirty-four cases, thirteen were plainly beyond the possibility of radical extirpation; in ten

of these operations of a palliative and incomplete nature were done, with two operative deaths. In three no operative interference was done.

Of the 21 cases in which attempts at radical extirpation were made there were no operative deaths; the after history of 9 is unknown; of the remaining 12 cases, in 2 there was speedy recurrence *in loco*, and in 5 there followed progressive development of metastases in internal viscera without local recurrence. The remaining 5 continue well to date, after periods of from one to two and a half years *post-operationem*.

OLD DISPLACEMENTS OF THE UPPER END OF THE FEMUR AND THEIR TREATMENT.¹

By CHARLES T. POORE, M.D.,

OF NEW YORK,

SURGEON TO ST. MARY'S FREE HOSPITAL FOR CHILDREN.

CASE I.—E. K., aged eight years, was seen by me in consultation, May 15, 1883. The following is the history of the case:

For the last nineteen weeks the patient has been confined to his bed with a severe attack of articular rheumatism involving many joints, including both hip-joints. For weeks he has been on his back, the thighs flexed on the pelvis, and legs on the thighs. On getting him on his side, a few days ago, it was noticed that his left thigh was strongly flexed and adducted, and that any attempt to change its position gave him much pain. He now has no acute symptom of his trouble: the heart is much damaged.

On examination it was found that the head of the left femur was dislocated backward and a little upward, the head could be distinctly felt in its new position. There was no swelling about the parts nor any tenderness on pressure.

May 20. After considerable difficulty the head was replaced into the acetabulum. There is still some flexion and adduction. Patient put to bed, and extension, six pounds, applied.

May 26. The head has become displaced again.

June 13. Tenotomy of as many of the adductor muscles as could be safely reached was done, also of the long head of the biceps; the head could then be easily replaced, and the limb could be moved in all normal directions. Patient placed in a wire brace extending from axilla to below feet and embracing both limbs, the left being abducted and extension applied.

July 10. Removed from brace. There has been no further displacement, but the limb is somewhat flexed and adducted. Extension in bed kept up.

¹ Read before the New York Surgical Society, March 28, 1894.

August 12. A hip-splint applied with an abduction screw, right foot raised with a high sole, and patient allowed to go about on crutches.

In November, on account of the persistent contraction of the adductors, another tenotomy was done.

The final result, after two years of treatment, was a useful limb for walking, but with considerable flexion and marked adduction, which seemed impossible to overcome. There is marked atrophy of the muscles about the trochanter major and the whole limb is wasted. Walking is labored and awkward. There is no pain about the limb. There is some motion at the joint.

August, 1892. Patient has been seen lately, but not examined. He walks with some limp. His condition has greatly improved, but there is still much flexion and adduction.

CASE II.—I. P., aged nine years, was sent to me by Dr. Gibney, and admitted into St. Mary's Hospital for Children, May 13, 1885, with the following history: When two weeks old a swelling was detected on the right thigh just below the hip-joint; this gradually increased in size until it attained considerable proportion; her mother states that it was as large as a child's head. There was much pain about the limb. When the patient was two months old the abscess was opened and continued to discharge for five or six weeks; later another abscess formed and opened above the joint. Patient began to walk at thirteen months, and has continued to do so until three weeks ago, when she fell on her knee; she immediately had pain about the hip, and that side of the pelvis has ever since been changed in shape, and she has been unable to walk without assistance.

On examination the trochanter major was found two and a quarter inches above Nélaton's line; the foot is pointed directly forward and can be turned inward and outward by the patient. The thigh is strongly flexed on the pelvis and cannot be extended.

Diagnosis.—An old epiphysitis and dislocation of the upper end of the femur.

May 24. Extension. No change having taken place.

July 24. Etherized. An incision was made down on to the head. This was found to be altered in shape, but entirely covered with cartilage; no separation of the epiphysis; but the surface of the head was flattened as though a piece had been lost from the extremity. There was no trace of the ligamentum teres.

The cartilage was removed from the head of the bone, also from

the acetabulum; the latter did not seem as deep as normal. A nail was passed through the neck and head, and then into the acetabulum so as to hold the parts in apposition. Wounds united, and patient placed in a Barwell's frame.

August 12. Some days after the operation the head slipped out of the acetabulum. Wound reopened. Epiphysis was found detached and loose. Nail broken off. Remains of head replaced, and held by extension in a Barwell's frame.

September 30. All wounds closed; splint removed. Head in position. Patient removed from the hospital by her friends.

March 6, 1891. Patient came to the hospital to-day and was examined. She has a good, useful limb; it is well developed and strong; no lordosis on standing; but it is short two and a quarter inches, due to the displacement of the head.

I think that the operation in this case was an error, on the supposition that the epiphysis had become detached or destroyed, and that dislocation had taken place from that cause, the operation was done; but the supposed conditions were found not to exist. Yet the ultimate result, although there is marked shortening, gives her a much better and more useful limb than if the operation had not been performed, the probability being strong that the head could not have been held in the acetabulum.

CASE III.—W. L., eight years of age, was admitted into St. Mary's Hospital, April 24, 1886, with partial paralysis and marked flexion of both thighs on the pelvis, the result of a cerebral meningitis.

June 26, 1887. Was transferred to surgical division. He had been on his back with both thighs flexed since his admission. His mental condition, which was much impaired at the date of entrance into the hospital, has greatly improved. It was found that the head of the right femur is displaced backward, but how long it has existed in this condition is not known.

February 8. It was found that the head of the bone was caught over the edge of the sacro-iliac foramen, and that any amount of justifiable manipulation failed to change its position.

February 18. An incision was made over the head and upper part of the shaft of the femur in order to gain access to these parts. The head was found enclosed in the capsule. The latter being greatly elongated and thinned, all the muscles attached to the trochanter major had to be divided before the head could be replaced in the

acetabulum, so fixed had they become in their altered position. No change had taken place in the acetabulum. The ligamentum teres had been ruptured. The wound was closed, except a small space for drainage, and extension with a long splint applied.

June 28. The wound has long since closed. It did well except that a few stitches gave way. The patient has been kept in bed in order to allow the parts to become well consolidated. He is now permitted to get up, and is sent down to Rockaway for the summer.

October 29. There is considerable motion at the hip-joint; shortening three fourths of an inch, patient going about. Patient discharged.

April, 1892. Patient came to the hospital to-day for examination. He has had no trouble since his discharge. There is an apparent shortening of two and three-fourths inches, due to displacement of the head of the femur. There has been no change in the actual length of the two limbs. There is but slight lordosis on standing. There is marked atrophy of the muscles behind the trochanter major. Flexion, abduction, and adduction are good; rotation limited. He can bear his weight on the limb. He is plump and well-developed.

CASE IV.—B. S., aged eight years, was admitted into St. Mary's Hospital, March 29, 1892, with the following imperfect history: Before she was one year old it was noticed that the right thigh was flexed and that she was lame. No further history can be obtained. On examination there is found to be a displacement of the upper end of the right femur backward and a little upward, the limb strongly flexed and adducted. Walking is difficult and awkward.

April 8. Etherized. On examination no ankylosis is found to exist and therefore no benefit could follow an osteotomy. An incision was made over the trochanter major extending down to the shaft so as to give access to the head. After separating the soft parts it was found that the head had disappeared and that the neck was represented by an irregular stump. The acetabulum was not looked for, as it would have been impossible to replace the remains of the neck without an extensive dissection, and, if replaced, could not have been held in position. The remains of the neck were removed with an osteotome, and the limb brought into a fair position. The wound was closed, except at its most dependent portion, which was left open for drainage. Extension and a long splint.

May 24. Has had no pain or temperature; wound firmly closed.

Position of the limb good; no flexion. Patient up with a long hip-splint.

October 20, 1892. Re-examined. Shortening two inches. There is not much active motion in the limb at its upper extremity. No pain. No deformity in the direction of flexion, abduction or adduction.

All of these four cases do not belong to the same class, but for the purpose of this paper are grouped together, having three points in common,—namely, (1) the displacement, (2) the consequent deformity, (3) the question of treatment.

Case I was treated outside of the hospital, and is only introduced here as showing the result in a case of spontaneous dislocation treated by manipulation.

Cases I and III are examples of spontaneous dislocation, occurring during long recumbency on the back with the thigh strongly flexed on the pelvis and adducted.

Case II was probably a traumatic dislocation in an impaired joint.

In Case IV the displacement of the upper end of the femur was pathological, and due to acute arthritis in childhood. Whatever the cause of the deformity may have been, the indication in all these cases was to give the patient a limb that would be useful for walking.

In Cases I, II, and III, as far as the head of the bone and the acetabulum were concerned, there was no disease and no contraindication to the replacement of the head; the obstacle was in the altered relations of the muscles.

In Case IV the joint had been destroyed. There was no dislocation, because the joint had ceased to exist. Such cases should be classed as displacements, and are pathological in contradistinction to spontaneous and traumatic dislocations. In the former class it is possible to speak of reduction; in the latter impossible, because the joint has ceased to exist.

In Case I the head was returned to the acetabulum after manipulation and was held there for a few days, when it became displaced and was reduced again after a free tenotomy, and has remained in contact with the acetabulum ever since. The ulti-

mate result after nine years is fair, his walk is labored and with much more limp than in Cases II and III. The duration of active treatment extended over three years.

In Case II an error was made in diagnosis ; it was supposed that there had been a separation of the epiphysis, due to an old epiphysitis, yet the operation demonstrated that there had been no separation. I do not think that the head could have been held in its normal position by simple reduction. The attempt to obtain ankylosis failed, and although the patient was discharged with the head in the acetabulum, it became displaced in time, but with this gain, that there was no abnormal flexion or adduction. The limb is well developed and strong, and the patient walks easily without limp, only the limb is short.

Case III was a case of spontaneous dislocation. Here again the head was returned to the acetabulum. After a cutting operation the head remained in good position for four months, and the patient used the limb. In this case also after five years the displacement was found to have returned, and as far as the position of the head was concerned the operation was a failure, but the limb is strong and useful, with slight flexion. It is short more than two inches.

In Case IV no attempt was made to replace the upper end of the femur, first, because there was no head to replace, and secondly, if there had been, previous experience led me to think that any such attempt would prove a failure. The remains of the neck were cut off so as to let the shaft slide up, and thus relax the shortened muscles, and allow the limb to be placed in a straight position.

The object, I think, of an operation in old displacements of the upper end of the femur, whether due to a true dislocation or pathological displacement, is not to restore the head of the bone to its normal position, but to correct the secondary deformity, flexion and adduction, and give the patient a useful limb, although a shortened one.

After a displacement has lasted for some time the muscles attached to the upper end of the femur become fixed in their abnormal position, some become lengthened, others shortened,

and these changes are of such a nature that the position of the head cannot be changed without a very free section; the head can then be replaced. But there is nothing to hold it in the acetabulum, and soon after weight is thrown on the limb the head will escape, and the operation, as far as the reduction is concerned, will be a failure. At least this is the history in two of my cases. The ultimate result in these four cases is as follows: Case I, although the head is in its normal position, flexion and adduction still exists to a troublesome degree, and the result is fair. I do not think that the limb is so good or useful a one as in Cases II and III, notwithstanding the shortening.

In the remaining three cases the limbs, although short, are very useful, and there is but little or very slight flexion and no adduction.

In Case III the patient can raise himself onto a chair with the shortened limb.

Four methods of affording relief in this class of cases have been tried.

- (1) Manipulation.
- (2) Subcutaneous osteotomy.
- (3) Arthrotomy.
- (4) Excision.

In some cases a reduction is possible, as in Case I. Where that can be accomplished the result may be good, depending, of course, on the length of time the deformity has existed; but even after a reduction considerable flexion and adduction will remain, and these are very difficult deformities to overcome.

I have never tried an osteotomy, for the reason that I would not expect any permanent benefit. The indications for an osteotomy would be to correct the flexion and adduction. In order to do this section of the limb in this position would have to be made below the trochanter minor; an operation above this point would leave the muscle inserted into the trochanter minor still acting on the shaft, and a correction could not be attained.

In case of dislocation the head is not firmly ankylosed. After an osteotomy below the trochanter minor the lower fragment would be united to the upper at an angle, and as soon as

any weight was put on the limb further flexion would be inevitable. In case of non-union the danger from a necrosis of the upper fragment is great. As far as my experience goes with deformities of the hip without firm ankylosis an osteotomy has always been followed by a relapse of the flexion and adduction, as soon as the limb was used.

(3) In two cases an incision was made down upon the head and upper portion of the shaft, and after a very full division of the muscles inserted into the trochanter major the head was replaced. If these two cases had been reported when the patient left the hospital they would have been reported as successes. But in time the head of the bone in both of these cases became displaced, but with this gain, that the limbs are useful ones, with no deformity other than the shortening, normal motion being but slightly restricted.

(4) Excision of the head of the femur has been resorted to more frequently than any other method for correction of the flexion and adduction, and it has been followed in all cases reported by satisfactory results. In Case IV it was resorted to, and with good result.

From the above I think that displacements of the upper end of the femur, with deformity,—flexion and adduction,—if the dislocation cannot be readily reduced in cases of this latter class, a removal of the head so as to allow the shaft to slip up, and thus relieve the shortened and contracted muscles, is followed by the most satisfactory results.

The question as to how much manipulation is justifiable, and how long persisted in, in order to replace the head into the acetabulum, must be left to the judgment of each operator. It must be remembered that after reduction marked flexion and adduction will remain; these malpositions are very difficult to correct. The attempt to return and hold the head in its normal position by free section of muscles has in my hands proved a failure.



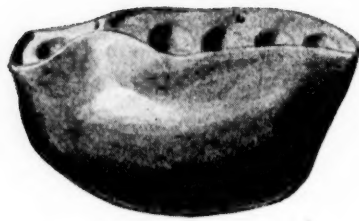


FIG. 1.—Inter dental rubber splint.



FIG. 4.—Artificial teeth and "plumper."



FIG. 6.—Inter dental rubber splint used in case 3.

CASES ILLUSTRATING THE USE OF A MECHANICAL
APPLIANCE TO CORRECT THE DEFORMITY
AFTER REMOVAL OF HALF OF
THE LOWER JAW.¹

By CHARLES McBURNEY, M.D.,

OF NEW YORK,

SURGEON TO THE ROOSEVELT HOSPITAL.

THREE years ago, when about to operate on a young woman for osteo-sarcoma of the left half of the lower jaw, it occurred to me that, by making use immediately after the operation of a well-fitting interdental splint, the remaining portion of jaw might be so held in place as to prevent for the time being its displacement by the unopposed muscles. I therefore asked Dr. Albert Westlake, of this city, to make such a dental splint for me, and also to study the patient's mouth, and see if he could not, with his knowledge of dentistry, devise a permanent appliance, by which, when the interdental splint was removed and complete healing of the wound had occurred, the jaw could be kept in place and be made at least partially useful. Plaster casts of the jaws were taken by Dr. Westlake, and on the models a rubber interdental splint was made which fitted accurately the teeth of the upper and lower jaws on the side opposite the disease. The left half of the lower jaw, which was the site of a well-developed osteo-sarcoma of the spindle-celled variety, was removed on March 21, 1891, at the Roosevelt Hospital. On the day following the operation the interdental splint (Fig. 1) was put in place and the lower jaw firmly bandaged to the upper. At first feeding by the rectum was made use of, and then the patient was fed through the mouth on fluids. The wound healed rapidly, and the splint was kept continuously in place, being only removed for cleansing. In the mean time, Dr. Westlake had experimented with a view to

¹ Read before the New York Surgical Society, March 28, 1894.

producing a permanent appliance, and not long after the wound had closed it was put in place. Gold caps were placed upon the two left upper molars. These were soldered together, and from their inner face projected downward, at an angle of 45 degrees, a bit of stiff gold wire. A gold cap was also made for the lower left cuspid, and from this projecting upward and to the left was a second bit of gold wire. The power required to keep the remaining half of the lower jaw in normal position had been carefully measured with a delicate spring balance, and a correspondingly powerful, though delicate, piece of spiral steel spring was put in place, one end being slipped over the bit of gold wire above, and the other over the gold wire below. (Figs. 1 and 2.) The patient was able, with very little practice, to open and close the mouth perfectly, and to obtain perfect articulation between the teeth of the upper and lower jaws. By the use of this appliance the patient so far obtained muscular control of the lower jaw that, after a few weeks, she could open and close the mouth without the presence of the spring, and yet make perfect articulation between the teeth.

About six months later the spurs and spring were removed, and a metal plate carrying a rubber "plumper" and a complete set of teeth, which filled out the cheek, was fitted to the mouth, and this has been worn since that time. (Fig. 4.)

The method was so successful that I have since applied it to two other patients.

Miss S., twenty-two years of age, came under my care at the Roosevelt Hospital on January 24, 1893. An ovoid tumor about two inches long occupied a portion of the right half of the lower jaw. Exploratory incision was made, and the tumor shown by microscopical examination of tissue by Dr. Hodenpyl to be a spindle-celled sarcoma. On February 11, I removed the whole of the right half of the lower jaw by external incision. On the following day the interdental splint was applied. Rectal feeding was made use of for four days, and then the stomach-tube carried all nourishment for ten days more. After that swallowing was permitted.

The wound was entirely healed by April 21. During the summer the appliance already described was fitted, and has been worn ever since.

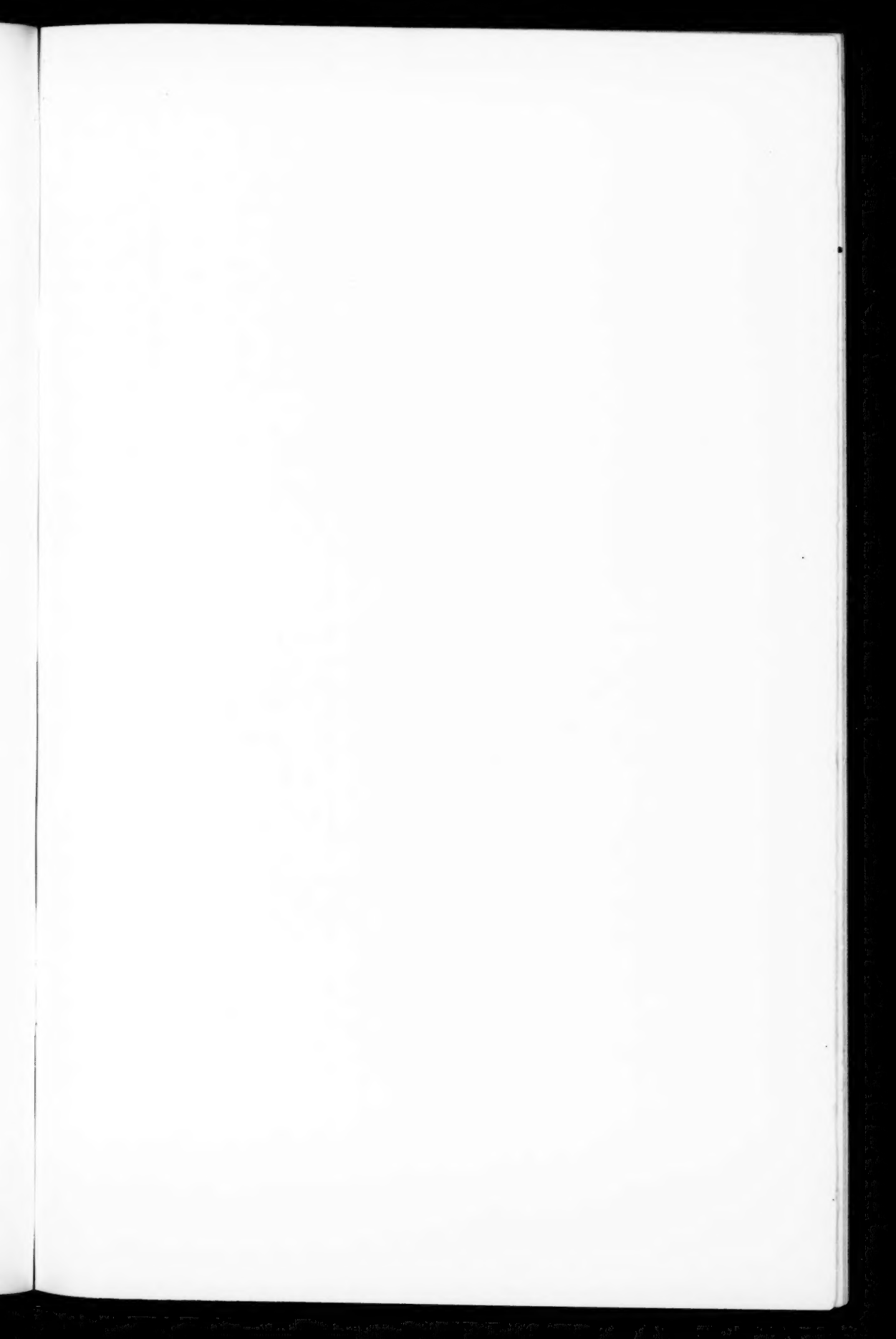




FIG. 5.—Excision of half of lower jaw. Deformity obviated by inter-dental appliance.

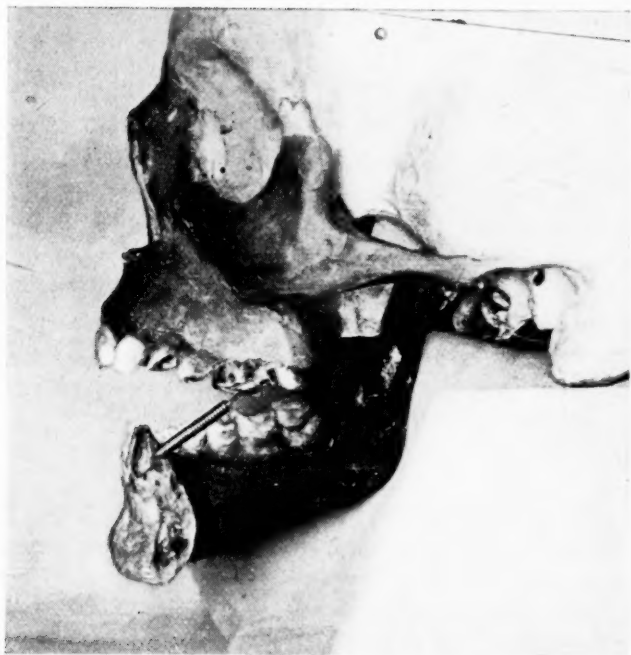


FIG. 2.—Spiral spring in position, side view.

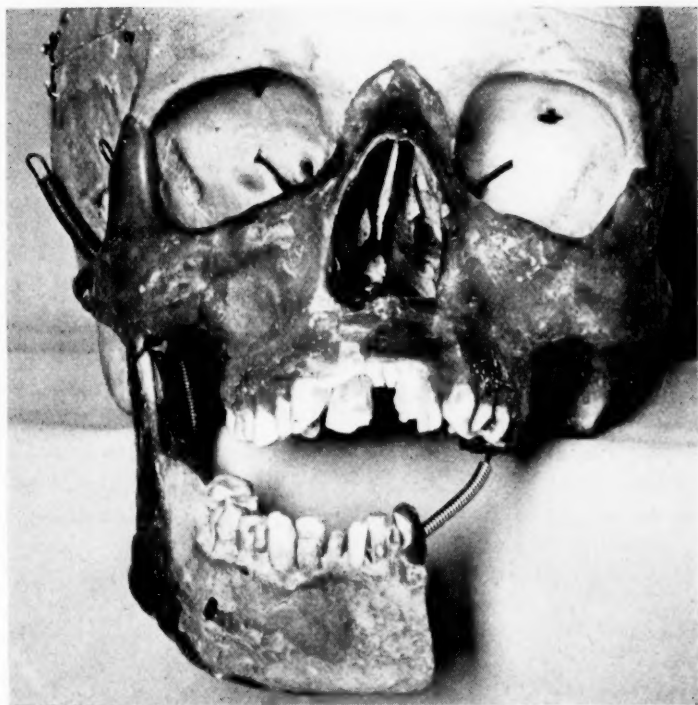
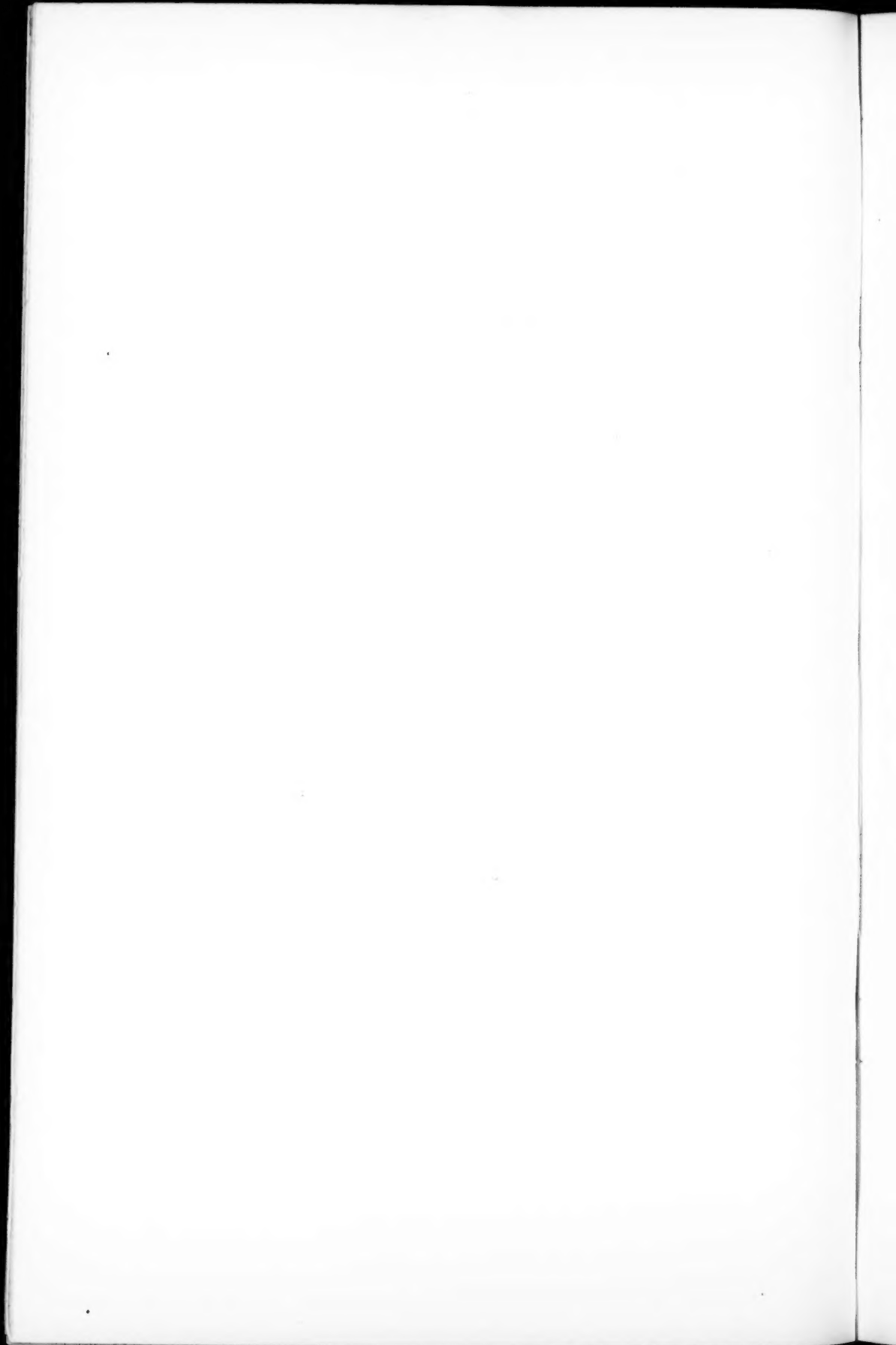


FIG. 3.—Spiral spring in position, front view.



The patient says that she can eat and masticate well all varieties of food, that she has no pain of any kind, and is in every way comfortable. By examination of this patient it can be seen that the movements of the jaw are good, and that the articulation of the teeth is perfect. When her condition is compared with the usual hideous one of a patient who has had the same operation performed, and who has had no appliance to remedy the defect, the improvement made will be appreciated. (Fig. 5.)

The third patient, Miss T., twenty-four years of age, was operated upon by me at the Roosevelt Hospital, on December 23, 1893. Preliminary incision had been made, and a portion of the tumor which occupied the left lower ramus was examined by Dr. Hodenpyl, and the disease pronounced to be osteo-sarcoma. The whole of the left half of the lower jaw was removed. This patient was treated in the same manner as the other cases (Fig. 6), and although the use of the appliance has been continued a shorter time, still the articulation of the teeth is good and the condition of the patient extremely comfortable.

Both of these patients will soon be fitted with plates carrying "plumper" and teeth corresponding to those removed with the disease.

They both can bite into an ordinary apple and masticate the hardest cracker with perfect ease.

I wish to call attention to an important feature in connection with this method of treatment. The spiral spring is essential but a very short time. During its limited use these patients, even the one most recently operated upon, have acquired such control over the half jaw that they can now articulate and masticate when the spring is not in place. The essential part of the method is the application, immediately after operation, of the simple interdental splint, and its constant use until complete cicatrization has taken place. As soon as the interdental splint is removed, and the spiral wire spring applied, the patient begins at once to cultivate the muscles, and rapidly acquires voluntary control of the jaw.

THE INCISION MADE IN THE ABDOMINAL WALL
IN CASES OF APPENDICITIS, WITH A DE-
SCRIPTION OF A NEW METHOD
OF OPERATING.

By CHARLES McBURNEY, M.D.,

OF NEW YORK,

SURGEON TO THE ROOSEVELT HOSPITAL.

SURGEONS are practically unanimous in discarding the median incision of the abdominal wall when operating for appendicitis. The division of the tissues in the median line is very easily accomplished, and the repair of the wound is probably more perfect than when the incision has been made at any other point, but the entrance to the peritoneal cavity, which is thus effected, does not so readily permit either the operative work in connection with the appendix within the cavity, or the subsequent treatment of the wound in any case where complete closure of the incision is contraindicated.

The usual situation of the appendix, well to the right of the edge of the rectus muscle, and the fact that abscesses and other lesions arising in disease of the appendix are largely confined to the right half of the abdomen, have led operators, almost without exception, to make their entering incisions either at the outer edge of the rectus or at some point between this muscle and the anterior spine of the ilium.

In my earlier operations for the removal of the appendix at the beginning of the disease, and in recurrent cases operated upon in the interval between attacks, I always made the incision parallel with and near the right edge of the rectus. The advantages of this incision are that the deeper tissues divided are purely tendinous, that the hæmorrhage is slight, and that the suture of the wound, when closure is permitted, is very easy and satisfac-

tory. The disadvantage is that the situation of the appendix is usually still farther to the right; indeed, it is often close to the outer part of Poupart's ligament, and, frequently enough, the appendix points upward to the outer side of the colon. In all such cases, if an incision by the side of the rectus is made, the operator is forced to work beneath the overhanging shelf formed by the outer part of the abdominal wall, and the subsequent removal and reintroduction of gauze drainage material, in cases where complete closure is contraindicated, is decidedly interfered with. It has seemed to me that in all cases where it is desirable first to locate the base of the appendix, and usually too where one wishes to make an entrance into an abscess originating in disease of this organ, it is much better to incise the abdominal wall a little to the outer side of the normal situation of the appendix. The inner edge of this wound is drawn inward by a retraction, and but little tissue has to be drawn outward in order to fully expose the caput coli and allow of easy identification of the base of the appendix. Through this incision also, or through a parallel one made still nearer to the anterior spine of the ilium, it is easy to enter, empty, and subsequently treat almost every case of abscess. Of late years I have made almost all incisions for appendicitis about as follows: The incision in the skin is an oblique one about four inches long. It crosses a line drawn from the anterior iliac spine to the umbilicus nearly at right angles about one inch from the iliac spine, and is so situated that its upper third lies above that line.

The incision of the aponeurosis of the external oblique is a little shorter, and practically merely separates the fibres of that muscle and its tendon without cutting them. The section of the internal oblique and transversalis muscles follows, cutting the muscular fibres nearly at right angles to their course, and is completed only at the central half at first. This deeper incision can be readily lengthened if, after cutting the fascia transversalis and peritoneum, the character of the lesion seems to call for more space. The above description corresponds accurately to the incisions I have made during the last few years in the large majority of cases, although, of course, abscesses unusually placed

have required sometimes a larger opening, and sometimes an incision beginning at a higher or at a lower point, or placed much nearer Poupart's ligament. In all of these sections the damage done to the abdominal wall is considerable, and we have all of us been disappointed, especially after operating upon suppurating cases, when it has been necessary to treat abscess cavities with gauze drainage, to find that even very perfect treating of the wound has been followed by small or large ventral herniæ.

It can certainly be affirmed that the formation of a hernia subsequent to these operations is not due to any particular *length* of incision, nor can a specially restricted incision insure against the same result.

In regard to the exact length of the incision, I would say that it should be adjusted to the necessities of the case, just as incisions in other parts of the body, made for various purposes, should be adjusted. Incisions should be long enough to allow complete and safe work to be done, and it is most unscientific and harmful to encourage those of limited experience to believe that a special measure of good goes with a special length of incision. If the parts severed in the making of a wound are properly adjusted, and the wound properly treated, repair will be just as rapid and complete whether the wound be five inches long or three inches long, while, on the other hand, no good surgeon will ever unnecessarily divide tissue simply because he can again obtain repair.

When hernia occurs after an operation for appendicitis, it is due to the imperfect repair following the complete section of a number of superimposed tissues, and it has sometimes followed, both in cases where the incision was made just at the linea semilunaris, and also when made through the muscular wall outside of this line. In abscess cases where a free incision and also open treatment of the wound for drainage are essential to safety, hernia of greater or less dimensions is not unfrequently seen within a year after operation.

By the term hernia, used in this connection, is meant the partial eversion of the cicatricial tissue caused by intra-abdominal pressure at one or more points in the line of the wound, where

repair of the deeper tissues incised has been imperfect. Even after operations for the removal of the appendix in the interval between attacks, and when the wound may be completely or nearly completely closed at once, small herniæ, of the same variety, are not unknown. The recurrence of hernia is due, first, to the more or less constant intra-abdominal pressure, and, secondarily, to the difficulty in obtaining perfect repair in the parts divided. The peritoneum is often very perfectly sutured, the transversalis fascia usually very imperfectly. The external oblique aponeurosis is usually, when its suture is permissible at all, very completely repaired. The greatest defect in repair is due to the section at right angles either of the muscular fibres of the internal oblique and transversalis, or of the tendinous fibres forming the conjoined tendon of these muscles at the edge of the rectus. In either case, the retraction of these muscular fibres, aided by intra-abdominal pressure, tends constantly to separate the edges of the deeper part of the wound, thus permitting at first slight, afterwards increasing, eversion of peritoneum, and the formation of an incomplete hernial pouch. Such cases require the use of an abdominal belt or other apparatus to give sufficient support to the belly wall. The consideration of this defective result in some cases has led me to attempt a different method of entering the cavity in operations for the removal of the appendix in non-suppurative cases.

The skin incision should be made as already described. The section of the external oblique muscle and aponeurosis should correspond, great care being taken to separate these tissues in the same line, *not cutting any fibres across*. This is easily accomplished.

When the edges of the wound in the external oblique are now strongly pulled apart with retractors, a considerable expanse of the internal oblique muscle is seen, the fibres of which cross somewhat obliquely the opening formed by these retractors. With a blunt instrument, such as the handle of a knife or closed scissors, the fibres of the internal oblique and transversalis muscles can now be *separated*, without cutting more than an occasional fibre, in a line parallel with their course,—that is, nearly

at right angles to the incision in the external oblique aponeurosis. Blunt retractors should now be introduced into this in turn and the edges separated.

The transversalis fascia is thus well exposed and is then divided in the same line. Last of all the section of the peritoneum is made.

Two sets of retractors must be in use, one holding open the superficial wound from side to side, the other separating the edges of the deeper wound from above downward. A considerable opening is thus formed, through which, in suitable cases, the caput coli can be easily handled, and the appendix removed. The appendix having been taken away, the wound in the peritoneum, which is transverse, is then closed by suture. The similar wound in the fascia transversalis is also sutured. The fibres of the internal oblique and transversalis muscles fall together as soon as the retractors are withdrawn, and with a couple of fine catgut stitches the closure can be made more complete. The wound in the external oblique aponeurosis is sewed with catgut from end to end. When the operation is completed it will be seen that the gridiron-like arrangement of the muscular and tendinous fibres, to which the abdominal wall largely owes its strength, is restored almost as completely as if no operation had been done. In performing this operation I have noticed several advantages.

In the first place, muscular and tendinous fibres are separated, but not divided, so that muscular action cannot tend to draw the edges of the wound apart, but rather to actively approximate them. Excepting during the incision of the skin, almost no bleeding occurs. The fascia transversalis not being drawn away by the retraction of the deepest layer of muscular fibres, this fascia is easily completely sutured, and thus greater strength of repair is assured. No muscular fibres or larger nerves having been divided, pain after operation is almost absent. The operation requires rather more time than the usual one, and a larger number of assistants is needed, for four retractors are in use during part of the time. The opening into the peritoneal cavity is not large, but may be made larger if necessary, by continuing

the separation of the fibres of the internal oblique and transversalis, and dividing the conjoined aponeurosis in the same line with scissors. In the opposite direction the separation of muscular fibres may be carried as far as the crest of the ilium.

I have now done this operation on four patients, all cases of recurrent appendicitis operated upon in the interval between attacks. The first operation took place at the Roosevelt Hospital on December 18, 1893. Sufficient time has not elapsed to justify me in presenting the final results as positively an improvement upon those obtained by older methods. I shall expect, however, in these cases, a much more perfect result as regards the strength of the abdominal wall than is usually observed.

I present the method now, hoping that others may be induced to give it a trial.

This operation does not appear to be suitable for cases accompanied by suppuration about the appendix, which require to be treated by extensive packing with gauze, nor in cases non-suppurative which require during operation a large intra-abdominal dissection.

It is not an easy operation, and should not be attempted by those who are unfamiliar with operations upon the appendix, and I again call attention to the fact that in performing it two extra assistants will be occupied part of the time with retractors.

SIMULTANEOUS LIGATION OF BOTH INTERNAL
ILIAC ARTERIES FOR HYPERTROPHY OF
THE PROSTATE GLAND (BIER'S
METHOD).¹

By WILLY MEYER, M.D.,

OF NEW YORK,

PROFESSOR OF SURGERY AT THE NEW YORK POST-GRADUATE MEDICAL
SCHOOL AND HOSPITAL, ATTENDING SURGEON TO THE GERMAN
AND TO THE NEW YORK SKIN AND CANCER HOSPITALS.

OF all the operations which have been proposed for the radical cure of the hypertrophied prostate, none, I believe, appeals more to our sound judgment than the ligation of both internal iliac arteries. The method has suggested itself to Dr. Bier, of Kiel, first assistant to Professor von Esmarch, on considering the effects of ligation of the uterine arteries for myoma uteri, of ligation of the thyroid arteries in cases of goitre, and of ligation of the nutrient arteries in fibroid tumors of the breast. He had observed in cases of the latter kind that a fibroma had disappeared two years after the operation, and yet the woman was able to nurse her child, which had been born meantime, equally well with both breasts, there being not the slightest atrophy of the one formerly operated upon.² Bier concludes that it is a fact that "benign tumors of muscles, glands, and connective tissue can entirely disappear or be greatly reduced in size by diminishing their blood-supply, the function of the parts involved generally not being interfered with.

¹ Remarks made before the New York Surgical Society on April 11, 1894, presenting the patient.

² The operation consisted in encircling the upper and outer periphery of the breast with an incision which went down to the muscle, preparing off the breast from the underlying tissues, so that the entire organ was held by the skin bridge towards the inner and outer periphery only. All bleeding vessels and the arteries leading to the breast were ligated, and the tumor especially bluntly undermined all around. Then the breast was replaced and the skin-wound closed by suture.

Basing on this experience, he tried the same kind of surgical interference for the sake of reducing the hypertrophied prostate. Which vessels should be ligated? Branches of the internal pudic and median hæmorrhoidal arteries (Adams), also of the inferior vesical (Thompson), feed the prostate. There are many anomalies in their origin. Surgically, all these branches cannot be easily reached or found. It was therefore necessary to ligate the main trunks,—the internal iliacs,—best simultaneously. To apply the ligature below the branching off of the superior gluteal artery would unnecessarily complicate the operation.

An article giving a *résumé* of Bier's experience with ligation of the internal iliacs for reduction of hypertrophy of the prostate appeared in No. 32 of the *Wiener klinische Wochenschrift*, August 10, 1893. Bier had then done the operation three times,—once by the transperitoneal method (Gibson), twice by the extraperitoneal method (Valentine Mott). Much difficulty was experienced during the first operation on account of a troublesome narcosis, it being necessary at last, in spite of Trendelenburg's posture, to take out a large portion of the small intestine in order to reach the arteries. Considerable time was thus consumed. The patient died of septic peritonitis on the third day after the operation. The latter two patients, sixty-five and sixty-nine years old, recovered nicely. Two of the three had been able within the first twenty-four hours following the operation to pass urine voluntarily in a small stream; the third began to pass it on the third day after the ligation of the arteries, while before they had been unable to pass a drop. In one of the cases intermittent retention occurred again on the third day after the operation, lasting nine days. Then the urine was again voided spontaneously. In the two cases which survived there was afterwards progressive improvement. One of the patients stated, four months later, that he could urinate just as well and as easily as ever before. No trouble had resulted from the ligation as such.

While I was under the impression produced by Bier's article, a
* patient, a man fifty-five years old, came under my care at the German

Hospital, October, 1893, who had had marked urinary trouble for over four years. When a young man he had suffered from gonorrhœa four times; the last attack was twenty years ago, when at one time he had been unable to urinate. He was relieved by the catheter. In 1864 he had contracted syphilis. Increasing difficulty in micturition was first noticed six years ago. In 1890 retention set in for the first time. A good deal of gravel was passed. He had been unable to pass a drop of water the past six months, using the catheter altogether. Examination revealed general hypertrophy of the prostate; the upper border of the gland could just be reached by forced rectal digital examination. Urine purulent. To verify the diagnosis by ocular inspection cystoscopy was performed. There was the characteristic picture of hypertrophied prostate with marked *vessie à colonnes*. Turbulent urine was seen coming down from both ureters, thus confirming the result of the urinary examination,—pyelitis (bilateral). The bladder easily held a quart of fluid. Length of the urethra, twenty-three and a half centimetres; patient very stout; weighed two hundred and thirty pounds.

On October 5, I proceeded to ligate the internal iliac arteries, as suggested by Bier. I first operated upon the left side. The patient lying upon his back, an incision, slightly concave inwardly and five inches long, was made parallel with the upper third of Poupart's ligament running up towards the inner end of the eleventh rib. The common and internal iliacs were reached without much trouble. Two hands of the assistant were needed to hold back the peritoneum with the large amount of the properitoneal fat. After dividing the sheath of the internal iliac (the wall of which was elastic, not atheromatous), it was separated from the vessel by a strongly-curved blunt hook, and a catgut thread thrown around the vessel by means of an aneurism-needle. At this point hæmorrhage was observed, coming from above from the just strongly-flexed anterior wall of the vessel. (In trying to find out the cause of this accident I believe it to have been due to my having unintentionally used a curved scalpel when dividing the sheath of the vessel. It had been handed to me by the assisting nurse. The cut, which should have divided the thin sheath only, thus caused, down in the deep funnel of the wound, a slight injury of the vessel. It would have been better to have used a straight scalpel.) The assistant at once compressed the common iliac with his finger, while I quickly disengaged the thread from the eye of the aneurism-needle, cut it in two, and tied first the distal, then the proximal end of the vessel, about one-quarter of an

inch apart from the small wound in its wall, which could be very plainly seen. On account of the direct descent of the internal iliac after its branching off from the common, also on account of the great depth of the wound, I did not succeed in putting the ligatures farther apart. Now the artery was divided with the scissors between the two threads. The hæmorrhage had ceased. Suddenly it again set in in a most alarming way. Again the common was compressed by the assistant's finger, when it was seen that the ligature had slipped from the proximal (cut) end of the internal iliac. Further attempts at properly placing a ligature proving futile and bleeding continuing, I applied a long artery-forceps, for safety's sake on each end of the divided vessel, and left them in place, surrounding them carefully with gauze. Their ends projected from the middle of the abdominal wound. After closing the wound on this side, above and below the two forceps, by suturing the different layers separately with cat-gut, I proceeded to make a like incision on the right side. The operation was made a great deal easier here by placing the patient in Trendelenburg's posture as soon as the peritoneum had been reached. The sheath of the internal iliac was opened, loosened for about one inch, and a double catgut ligature applied. On account of the comparatively short space between the two ligatures, I deemed it the wisest not to divide the artery between them, but to trust to occlusion by thrombus. The wound was entirely closed by suture without drainage, stitching layer by layer, and covering the sutured skin-wound by a strip of iodoform gauze and collodion. The patient made a good recovery. He had not suffered materially from the loss of blood. The first dressing was changed on the fifth day, when the two clamps were easily removed and the surrounding gauze extracted. No hæmorrhage took place. The sutured wounds had healed by primary intention throughout, the track of the forceps alone remaining open on the left side.

On the evening of the twelfth day the patient suddenly noticed a hot feeling on the left side; secondary arterial hæmorrhage had set in. The well-trained nurse, who had been with the patient all the time, made compression at once, and continued the same until the patient had been brought to the operating-room, where the house-surgeon after proper disinfection introduced his finger down to the depth of the bleeding canal and compressed the vessels as well as it could be done. Meanwhile, one had sent for me. When I arrived at the hospital, I placed the patient in Trendelenburg's posture, opened and enlarged the outer wound, and found to my surprise the following

interesting condition: The hæmorrhage had not come from the internal iliac, but from the external iliac. On account of a slight change of position on the part of the patient's pelvis, I believe, probably due to the great softness of the mattress of the bed, the forceps, though carefully surrounded by gauze, had caused pressure-necrosis of the external iliac at the spot where it had crossed the same. This had led to the hæmorrhage. There was a defect of about half the size of a ten-cent piece in the anterior wall of the external iliac just below the bifurcation of the common. While the assistant now continued to make pressure on the common, I ligated the external iliac below the perforation and then the common iliac. Catgut cut the vessel twice in different spots. It was necessary to enlarge the wound upwardly, strip off more of the peritoneum, and ligate the common iliac close to the aorta. This time braided silk was used. The bleeding was successfully checked.

Soon after the operation gangrene of the toes and a part of the metatarsus developed, which later necessitated irregular amputation of the anterior portion of the foot.

With reference to the influence of tying both internal iliac arteries upon the hypertrophied prostate in my patient, I have to state the following: Twelve hours after the operation the patient began to pass his urine—two ounces—in a very fine stream voluntarily for the first time within six months.¹ During the following fifteen days he frequently voided small quantities through the urethra, but also had to be catheterized. On October 23 he commenced to pass larger amounts at a time with a satisfactory stream; largest quantity was on October 23, 350 cubic centimetres; on the 24th, 240 cubic centimetres; and on 25th, 550 cubic centimetres. He urinated every one to two hours. On October 26, 130 cubic centimetres having just been voided, the catheter withdrew 730 cubic centimetres of residual urine. Two days later 225 cubic centimetres were voluntarily passed at 1 A.M., 110 at 3 A.M., and at 5 A.M. the catheter withdrew a full quart of water. The muscular power of the bladder evidently was greatly reduced (atony). Yet continuous retention did never set in again after the operation had been performed. As soon as the foot had healed, and the patient began to walk about, he regained better power

¹ As mentioned above, the same phenomenon had been seen in two of Bier's cases. He concluded, no doubt with propriety, that the sudden reduction of the afflux of blood had diminished the size of the gland.

over the bladder. At present he is able to go two hours,¹ and then pass ten to twelve ounces in a forcible stream. Residual urine is still considerable, ten to twenty-four ounces. I am convinced that atony is the only cause of the patient's present inability to completely empty the viscus. The prostate on rectal palpation is markedly smaller than before the operation, almost normal in size. The length of the urethra, which was twenty-three and a half centimetres before the operation, has been reduced to twenty-one and a half centimetres within the six months the patient has been under my care. (Twenty-one centimetres is the length of a normal urethra.)

Certainly the result obtained in this case is encouraging in the extreme. I shall, no doubt, continue to operate on the same plan² in suitable cases,—viz., patients with "recent" retention where marked dilatation with atony has not yet set in, as Bier did in his three cases. But in order to simplify the act of ligation I shall henceforth use silk, and apply only one ligature after having opened the sheath. Or, should I again find it difficult in very stout patients to denude the vessel from its sheath to a sufficient distance, I shall not open the sheath at all, but throw the silk thread around the vessel *and* its sheath. The internal iliac artery and internal iliac vein have a separate sheath. In ligating the artery "*in its sheath*," wounding the vein and also

¹ At the time of leaving the hospital (April 28), three to four hours. It is to be hoped that with proper treatment the condition will improve still more.

² Three weeks ago, on May 21, I operated according to this plan on a man, sixty-three years of age, with retention, due to hypertrophy of the prostate. A single silk ligature was easily placed around each artery within its sheath and tied. The two wounds were sutured with catgut, layer by layer. The operation had been done aseptically. No reaction; primary union. Patient voided his urine in a fine, but forcible stream a number of times during the night following the operation. The bladder, which had reached up to the umbilicus before, could not be percussed above the symphysis any more. Retention did not set in again. On the fifth day after the operation the patient suddenly developed subnormal temperature without any apparent cause. This phenomenon increased in spite of suitable treatment. Patient died in a comatose condition on the eighth day after the operation. A very limited autopsy was permitted only. The internal iliac arteries did not show arterio-sclerosis; however, one common showed an atheromatous (macroscopical) deposit. Silk-ligatures aseptically healed in place. No thrombus whatever in the arteries on either side of the ligature. In the other one a thrombus three-quarters of an inch to one inch in length had formed in the afferent and efferent part of the vessel. It was adherent to the wall; it did not reach up to the bifurcation of the common. Certainly the functional result of the operation had been all that could have been desired.

the artery can thus be easier avoided. As just mentioned, I shall utilize silk for material. The possibility of reabsorption being thus out of place, one single ligature will suffice to permanently cut off this direction of the blood-current. It will then be unnecessary to apply a second one and divide the vessel between.

The fear, which at once suggests itself to our mind, that atheromatosis might be present in the wall of such large arteries in old patients, and cause primary or secondary hæmorrhage, is not borne out by facts. Bier found in the five internal iliac arteries which he tied for hypertrophy of the prostate thoroughly normal and soft walls. (He also found normal arterial walls in examining the prostate of the patient who died,—No. 1.) The same was noticed by me in my patient. It is well known that Lannois and Guyon are of the opinion that hypertrophy of the prostate, and other diseases of the urinary system connected with the same, were caused by general and local arterio-sclerosis. Lately Casper¹ has shown this assumption to be unfounded. By a series of very careful researches he comes to the conclusion that hypertrophy of the prostate and arterio-sclerosis of the genito-urinary system are often found in the same patient. Yet the one process is not the consequence of the other one.

The causative element for hypertrophy of the prostate has to be looked for, it seems, in the vascular system. The rapid decrease in the size of the swollen gland after ligation of both internal iliac arteries points in that direction; also, as it seems to me, the shrinking of this gland after double castration. F. Ramm, of Christiania, who first published this observation,² refrains from giving an explanation for this phenomenon; he only concludes that the prostate gland belongs to the genital system. A plausible explanation, I believe, is that the enlarged prostate steadily shrinks, as soon as the frequent intermittent active hyperæmia of the genital system, or rather of the genito-urinary system, which is produced by the presence and secretion of the testicles by ner-

¹ Zur Pathologie des Tractus urogenitalis senilis. Virchow's Archiv, Vol. cxxvi, I, No. 9.

² Centralblatt für Chirurgie, 1893, No. 35, page 759; here the author's name is wrongly spelled, "Rocum;" and Centralblatt für Chirurgie, 1894, No. 17, page 387.

vous reflex, is eliminated by castration. Perhaps the same result,—viz., progressive atrophy of the prostate—might be more easily and simply accomplished by dividing or resecting the spermatic nerves, provided we have determined to sacrifice the patient's virility. Certainly the physiological fact is of great interest, and will also be of practical importance in a number of cases, that double castration produces atrophy of the prostate. Yet, if experience will show that cutting off the direct blood-supply is a reliable remedy for this frightfully troublesome, so often deadly, disease,—viz., hypertrophy of this organ,—it must and will be better surgery, at least in the majority of cases, to ligate both internal iliac arteries than to deprive the patient of his sexual power.

With reference to the operation itself the double extraperitoneal incision will, no doubt, be preferable to the single transperitoneal. It must be remembered that in almost all the cases which have to be subjected to this kind of operation we have to deal with old, often very stout, subjects, with fatty degeneration of the heart, etc., who bear intraperitoneal interference not so well as younger ones.

If further observations should be equally satisfactory in regard to the final result, simultaneous ligation of the internal iliac arteries must necessarily become the standard radical operation for hypertrophy of the prostate. For it leaves the parts in their normal anatomical relation, and removes the obstruction in the simplest way: by producing progressive atrophy of the organ which causes the obstruction. It also keeps the generally old patients in bed for only ten to fourteen days, the wounds healing by primary union under the first dressing. The wounds which open bladder or urethra for attempting a radical cure of the hypertrophied prostate do not heal *per primam* and keep the patients in bed for a number of weeks. Hypostatic pneumonia is the threatening foe.

Of course, it has to be seen yet how far collateral circulation will later interfere with the result first obtained. Yet from experience made with the ligation of the feeding arteries of tumors in other parts of the body, it seems safe to predict "a progressive and permanently lasting atrophy of the prostate by ligating both internal iliacs for its hypertrophy."

A CASE OF OBSTRUCTIVE HYPERTROPHY OF THE PROSTATE TREATED BY CASTRATION.¹

By F. FREMONT-SMITH, M.D.,

OF ST. AUGUSTINE.

ON October 25, 1893, a patient, sixty-nine years of age, was admitted to Alicia Hospital, St. Augustine, who had suffered for a year with mild symptoms of prostatic hypertrophy. During the month previous to his admission increasing symptoms of obstruction had set in. During the seven and one-half weeks after admission he suffered with irregular fevers, urination was painful and frequent, especially at night, and the urine was loaded with the products of decomposition and pus. Retention attacks were frequent and the smallest amount of residual urine was six ounces.

From October 25 until January 17, 1894, the usual and approved treatment, internally and by bladder douches, was carefully conducted by Drs. L. Alexander, A. Anderson, and myself. During this period the patient steadily declined.

The depletion of repeated acute cystitic attacks, accompanied at each recurrence by excess of pus and septic fever, the harassing constancy of desire and the necessary loss of appetite and sleep, with the other effects of the local disease, reduced his weight during these seven and one-half weeks from 165 to 135 pounds. His weakness was alarming; all unfavorable symptoms were increasing.

During Christmas week, Dr. J. William White, of Philadelphia, saw the patient with me and called my attention to his suggestion made in June, 1893, at the meeting of the American Surgical Association, in regard to the possible advantages of castration in hypertrophied prostate.

I accordingly determined, with the consent of the patient and his family, to treat the case in that manner. The operation was performed aseptically on January 17.

¹ White's operation: orchectomy for hypertrophy of the prostate. Read before the Genito-Urinary Section of the New York Academy of Medicine.

During the week following operation the patient was catheterized twice daily; at the end of that period he attempted and successfully voided his urine, and the catheter was used twice each week, alone for the purpose of determining the quantity of residual urine.

No local treatment was employed subsequent to operation.

On March 1, six weeks after operation, the patient was discharged.

His general conditions were changed, in that he had subsequent to castration no fever from any source, appetite returned, weight increased from 135 to 163 pounds, mental state, previously weak and melancholic, made decided improvement.

His local conditions changed in that, instead of retention or residual urine of not less than six ounces, he had no retention attack or return of acute cystitis, and the residual quantity, steadily diminishing, during the final week varied between three drachms and one and a half drachms.

The nocturnal desire for urination was reduced from twelve and fifteen to four and six times.

The urine now presented a sediment only on standing for hours, which contained, under the microscope, a moderate number of pus-cells.

A brother of the patient, living at San Mateo, Fla., writes under date of May 2, 1894, fifteen weeks after the operation, that the patient had a few days before gone northward, that his weight was 180 pounds, and adds, "as to his water, he told me that he had no trouble at all and no pain from that source."

Dr. J. William White¹ first suggested the operation of castration as of possible advantage. His analogies and the results of experiments which he caused to be instituted upon dogs so find their complement in the results in the above case that I venture to offer some of them in condensed form.

The pathology of hypertrophied prostate is the same as that of fibromyoma. The results of oöphorectomy for this tumor in the female by virtue of lowered blood- and nerve-supply are successful. The tumor atrophies and its obstructive presence is reduced to quiescence and harmlessness. The pathological analogy suggests analogous treatment.

¹ Surgery of the Hypertrophied Prostate, *ANNALS OF SURGERY*, 1893, Vol. XVIII, p. 152.

Griffiths, quoted by White, notes the observation of John Hunter, that in males the prostate gland in winter was hardly discernible, but in the spring it becomes very large and filled with mucus. The same is true of the hedgehog during the season of rut. Hunter also says that while the prostate of a perfect bull is soft and bulky, that of the castrated animal is small, flabby, tough, and ligamentous. Observations of Griffiths on cats and dogs, castrated some years since, "show the prostate a mass of fibrous connective tissue, containing the remains of the once active gland tubules with a small number of atrophied muscle-fibres." Like changes he notes in the sheep, bullock, pig, and horse. Pelican, quoted by White, in a book referring to the Russian eunuchs, says that the prostates of eunuchs are about the size of those of children. Civiale and Gruber each note practical disappearance of the prostate in a man castrated in early life.

The advantages of this operation, were it to prove successful, are the thorough reduction of the mass in every dimension, reduction of blood- and nerve-supply of gland and bladder walls, continuous improvement as gland retrogression continues, and impossibility of relapse. Its freedom from danger recommends it in a class of cases most unfitted by the infirmity of age and a harassing disease to undergo a surgical strain of any moment.

Perineal prostatectomy has a mortality of 13.6 per cent. and suprapubic prostatectomy of 25 per cent. The button-hole operation frequently relieves, to a greater or less extent, but is accompanied by its fistula and fails in thoroughness. Electricity has only occasional usefulness.

White's experiments upon dogs are,—viz.:

The average weight of thirty-five prostates of dogs was found to be 15.4 grammes.

Seventeen days after castration a dog was killed. The weight of his prostate was 5.4 grammes; no structural change appeared microscopically. A dog whose average weight gave a prostate of 13 grammes, was killed thirty-one days after castration. Weight of gland, 5.7 grammes, beginning structural change in glandular structure. A dog killed in thirty days after operation presented a gland weighing 2.6 grammes. A

dog whose weight represented a normal gland of 19 grammes, thirty-two days after operation presented a gland 2.6 grammes in weight. A dog whose weight represented a gland of 14 grammes, in forty-one days after operation presented one of 5.7 grammes, with muscle fibres atrophied. A dog whose weight represented a gland of 30 grammes, fifty-four days after operation presented one of 4.4 grammes, connective tissue predominating. A dog killed in sixty days showed a gland of 1.5 grammes. A dog whose weight represented 21 grammes, killed in sixty-one days, presented a gland of 4.4 grammes. A dog whose weight represented a gland of 21 grammes, in 150 days after operation showed one of 4.5 grammes. A dog killed seventy-two days after operation presented a gland of 3.9 grammes. Little glandular structure remained.

The status of castration, as a treatment of one of the most dangerous and obstinate of the diseases of men of advancing years, will be determined only by the results of more numerous operations.

This paper is intended as a contribution to the present knowledge on the subject.

NOTE ON THE STERILIZATION OF CATGUT BY BOILING IN OLIVE OIL.

By B. L. EASTMAN, M.D.,

OF BURLINGTON, KAN.

CATGUT subjected to the ether-alcohol-bichloride process is unreliable as to its asepticity, and if kept long in bichloride becomes brittle and hard. Catgut in juniper oil is unreliable. Sterilization by boiling in alcohol is practised to some extent. Without considerable apparatus the method is difficult and expensive. Heat sterilization is more desirable and more efficient than chemical action, and I think the best medium is olive oil. This is cheap, non-irritating, non-inflammable, and has little or no odor. To try this medium a series of experiments were made, having two objects in view,—

- (1) As to the possibility of sterilizing catgut by heat.
- (2) The physical effect of high temperature upon it.

Three pieces of gut, each a yard long, were wound on glass slides, immersed in olive oil in a two-ounce, salt-mouth, glass-stoppered bottle, sealed, and the whole placed in a water-bath, and the vessel covered. The temperature was raised to boiling-point (212° F.), and kept there for three hours. For some reason the oil became turbid and cloudy, but cleared up again after two or three days. This marred the appearance very much, and before it was discovered that it would clear up of itself, some eight or ten samples were put through and then laid aside. After satisfying myself that the gut was not impaired, a sealed jar containing a single roll was sent to Professor Adolph Gehrmann, of the College of Physicians and Surgeons, Chicago. He kindly made a bacteriological examination for me, and wrote as follows:

“Method.—The jar was disinfected with bichloride, opened, placed in a covered sterile dish, the roll removed and placed in

another dish containing bouillon, where it remained three hours, being frequently agitated to remove all the liquid (oil). The gut was then cut into short pieces as it lay in the dish, washed in bouillon, and placed in a Petri dish on a layer of peptone-agar, and covered with liquefied agar.

"The slide, having some gut still attached, was placed in bouillon.

"*Control.*—Dishes containing similar culture media arranged side by side with the first. In these were dipped the forceps, knives, wires, and foil before and after handling the gut.

"*Result.*—Nine days' observation has shown the catgut, liquid, and slide to be entirely sterile. At no point has a colony appeared, either in the test or controls.

"There was no particular reason for keeping the temperature up for three hours, and I have no doubt now but that less time would suffice.

"As to the physical effect of high temperature upon the catgut:

"(a) Eight pieces were placed in a water-bath at 212° F. for two to four hours. Sizes varying from 0 to 8. Little change. It became smoother and more translucent. Strength remained the same as before.

"(b) Higher temperatures by use of sand-bath and chemical thermometer.

"Two pieces kept at 220 – 240° F. for four hours. No change. Two at 320° F. for four hours; more brittle. Raised to 370 – 380° F., became so brittle as to be useless. This was the greatest heat I could obtain with the small alcohol-lamp I had. Just what the boiling-point of the oil is I do not know, probably more than 400° F.

"Thinking that possibly the favorable results might be due to a superior quality of gut, I obtained four different specimens of quite ordinary quality,—fiddle-strings, guitar-strings, etc. These, tested very much as the first, gave similar results.

"(c) Finally all these pieces were resealed and laid aside for six weeks.

"Out of the eight subjected to 212° F., but one had become

brittle. This had been wound tightly, and broke where the edges of the slide had kinked it. Two pieces subjected to 240° F. for two hours were brittle where tightly wound. Where they were loose the strength was not changed. Two pieces subjected to 320° F. were dark and brittle, in fact useless.

"(d) What remained of all these were washed in alcohol, then immersed in absolute alcohol for four days. When examined there had been no change. Much better results would have been obtained by using reels or cylinders to wind the gut upon, instead of glass slides, which kink and cut it."

These few tests, while not exhaustive, will, I think, justify the following conclusions:

Catgut can be rendered sterile by heating in oil to a temperature of 212° F. for three hours.

The method is reliable, cheap, and rapid.

The quality is not impaired, and gut so treated is more satisfactory as to strength and smoothness than if subjected to the ether-alcohol-bichloride process.

A temperature higher than 212° F. is not necessary for sterilizing, and is an injury to the gut.

INTESTINAL OBSTRUCTION FROM STRANGULATION BY AN ADHESION BAND; RECOVERY AFTER LAPAROTOMY.¹

BY JOSEPH H. BRANHAM, M.D.,

OF BALTIMORE,

LECTURER ON RECTAL DISEASES IN THE COLLEGE OF PHYSICIANS AND SURGEONS OF BALTIMORE.

THE patient, Mollie R., first came under notice at the Bay View Asylum December 2, 1893, suffering with vomiting and colicky abdominal pains, slight pyrexia, no abdominal tenderness. A history of excess in diet the day previous was elicited and the attack attributed to that cause. Gastric sedatives and a purge were ordered, with no beneficial effects. The symptoms continued during the following day, to which was added some abdominal tenderness on pressure in the epigastric region. The vomited matter was a greenish bile-stained material, not stercoraceous. An enema was ordered, producing a small stool, and the vomiting was controlled by hydrocyanic acid and bicarbonate of soda. The patient improved during the next day, but the symptoms reappeared on December 5. The pain now became continuous, tenderness on pressure, especially marked in right iliac region and over McBurney's spot; the bowels markedly tympanitic, the abdomen distended, the vomit stercoraceous. A rapid and feeble pulse, intense thirst, face pallid and anxious, temperature slightly above normal, gave indications that the patient was reaching a state of collapse. A large dose of magnesium sulphate produced no effect, nor did turpentine stoups relieve the tympanites; nothing was made out by rectal and vaginal examinations. The marked distention of the abdomen due to extreme tympanites, the great tenderness over it, together with the slight elevation of temperature and the rapid pulse, taken in connection with the history of the case, made the diagnosis of intestinal obstruction very probable, and it was decided to operate

¹ Read before the Medical and Chirurgical Faculty of Maryland, April 26, 1894.

at once. After the usual preparations, an incision about three inches long was made in the median line between the umbilicus and pubes. After opening the peritoneal cavity, the inguinal and femoral rings were rapidly examined, and then the right inguinal region was searched. Here a band was found, holding down a loop of the ileum which was tightly constricted. The band was broken by the finger, and the gut released. At the points where it was grasped it was found to be narrowed to about one-half its usual size. The peritoneal covering of the gut was abraded at these points of pressure, but there was no indication of gangrene. The lowest constriction was about four inches from the ileo-cæcal valve, and the higher one was two inches farther up. The intestines above the band were fiery red, and greatly distended with gaseous and fluid contents; below, they were pale and collapsed. As soon as the band was broken the over-distended small bowels began to empty into the large, and the gurgling of the gas could be distinctly heard as it passed the ileo-cæcal valve. The band extended from the outer and upper part of the broad ligament to the cæcal region, and was evidently due to old inflammatory adhesions. One or two other small bands were found and broken up at the same time. The abdominal cavity was flushed and the wound closed with silkworm-gut sutures. The patient made an uneventful recovery. She had a large stool shortly after the operation, and complained principally of the strict diet enforced for the first few days. The patient had been sick for twenty-four hours before she came under observation, so that the obstruction had lasted for over four days before the operation.

The diagnosis of intestinal obstruction can usually be made with very great certainty, but the nature of the obstruction can be ascertained with much greater difficulty. Fortunately this is in most cases (after excluding those that can be relieved without operation) of little importance. The earlier symptoms are colicky pains which may be localized at the point of obstruction, or may be referred to the umbilicus. Not infrequently a tumefaction at point of lesion can be felt, and this may be very tender. Rapid distention of the intestines above the seat of injury, which at first is more *marked on the side of the lesion*, and in thin walled abdomens the distended loops of intestines may be made out.¹

¹ Von Wahl, Centralblatt für Chirurgie, 1889.

Hence, vomiting comes on early, is persistent, and later becomes stercoraceous. Symptoms of peritonitis and sepsis are present during the last stage of the disease, if relief is not secured. Indican urine is said by Rozenbush¹ to be present in all cases after the first twenty-four hours, unless the obstruction is very high up near the stomach. This was well marked in a case of rectal impaction recently in the case of Dr. Julius Friedenwald and myself. Dr. Friedenwald examined the urine and found that the reaction disappeared about twenty-four hours after the impaction was relieved.

Treatment.—Prompt action in cases where the symptoms point to obstruction is imperative. The ordinary means of relief should be applied at once, and if they are not successful, a laparotomy should be done. Purgatives should be given if faecal impaction is suspected, and the injection of large quantities of warm water with salts and glycerin, by hydrostatic pressure, slowly done, will usually give prompt return in such cases. This will also probably sometimes reduce a recent intussusception or twist of the bowel. Massage, with change of position, will assist in such cases. These measures are comparatively safe in the earlier stages, but may become dangerous after the bowel is weakened by inflammation or gangrene, or after adhesions have formed. If they are not successful, laparotomy should be resorted to during the first twenty-four hours if possible.

The dangers of delay are due to changes that take place in bowels and peritoneum from inflammation or pressure and to the absorption of their contents, producing septic intoxication together with the exhaustion of the patient from vomiting, etc. There can be no doubt that a large number of those operated on and who die would get well if the operation were done earlier. One reason for the usual delay in these cases is the difficulty of getting the consent of the patient and the family.

This can often be overcome by determined effort, and with improved results will gradually disappear to a great extent. I think that when an operation is refused until the patient is in a hopeless state it should not be done, as it will discredit both the

¹ Berliner klinische Wochenschrift, November 1, 1889.

surgeon and the operation and deter others from seeking relief at the proper time.

The use of opium, which masks the symptoms, giving a false sense of security, while gangrene or toxæmia are gradually coming on, cannot be too strongly condemned. The same objection can be made to washing out the stomach, but this should be done before or at the time of operation, as it will lessen the subsequent vomiting, as well as the danger of ptomaine absorption.

In conclusion, allow me to call attention to some points of special interest in connection with this case,—

(1) The successful termination after symptoms lasting over four days. This was no doubt due to the fact that the constriction was not tight enough to destroy the circulation of the blood, and probably did not, at first, prevent the passage of part of the contents of the bowel.

(2) It illustrates the advantage of examining the points of probable localization, instead of following the distended gut. If we succeed in finding the trouble in this way much time and unnecessary handling of bowels is saved. In the case reported the trouble was localized almost immediately, and the operation, including sutures and dressing, was completed in less than thirty minutes.

(3) The nature of the obstruction by inflammatory bands. These are not infrequently the cause, and the prognosis is very good in such cases, except when the operation has been delayed until gangrene has supervened or the patient has absorbed a fatal dose of ptomaines.

Cases due to similar causes have recently been reported by Alexander MacCormick,¹ two cases successfully operated on; G. A. Wright,² one successful case; Bryant,³ an unsuccessful case; A. Broca,⁴ one case with perfect recovery; R. M. Williams and J. R. Lunn,⁵ one case with death after abdominal section.

¹ Australasian Medical Gazette, June 15, 1893.

² Lancet, July 16, 1893.

³ New York Medical Journal, July 25, 1893.

⁴ Bulletin de la Société anatomique, Paris, July 7, 1893.

⁵ Lancet, January 23, 1893.

LARGE PSEUDO-DIVERTICULUM OF THE DUODENUM.

By LEWIS S. PILCHER, M.D.,

OF BROOKLYN,

SURGEON TO THE METHODIST EPISCOPAL HOSPITAL.

THE condition to be described in this communication I believe to be of great rarity, for I have been able to find in literature no report of any similar case.

As early as 1761, Morgagni, as recorded in his *De Causis et Sedibus Morborum*, noted in the body of a man, fifty-four years of age, the existence of a kind of diverticulum of the duodenum, situated at a spot distant two digits below the pylorus, where a loss of substance of the mucosa was evident, forming an orifice capable of admitting a finger leading into a cavity enclosed within the dilated outer coat.¹ In 1872, Roth² analyzes the literature of such diverticula up to that time, and adds accounts of five observations of his own. He concludes that they are acquired abnormalities, never contain in their walls all the intestinal coats, and that they occur only in advanced age, or as accompaniments to long-continued marasmus.

They are round, cylindrical, or irregular in shape, and never attain a size larger than a pigeon's egg. For the most part they are collapsed and empty; less frequently they are filled with the contents of the intestine. These diverticula have been found in the upper wall of the transverse portion of the duodenum, but much more frequently in the first or descending portion on its posterior inner wall adjoining the pancreas, where there is no peritoneal covering to the intestine.

¹ Morgagni, English Abridgment by Cooke, Vol. II, p. 414.

² Archiv für pathologische Anatomie, Bd. LVI.

It is obvious that ulcers of the duodenum, when situated on a portion of the gut not covered by peritoneum, as the result of their progress to the point of perforation, may excite varying degrees of suppurative and necrotic changes in the periduodenal tissues thus opened up. Even limited abscess cavities connected with the duodenum must, however, be extremely rare, when the relative frequency of duodenal ulceration is considered, for in my search of the literature of the subject I have found but one reference to any occurrence of the kind, unless the small diverticula, already referred to, owe their origin to such a source. The one reference I have found is in the Index Catalogue of the Library of the Surgeon-General's Office, of the United States Army, and is entitled, "Ulceration of the Duodenum; Formation of an Hepatico-Diaphragmatic Pouch."¹

In this case, a man, sixty-eight years of age, after having for a year or more been losing flesh and becoming cachectic, was suddenly seized with severe epigastric pain, attended with much shock. Reaction, however, was obtained, but he quickly developed a septic pneumonia and parotiditis, from which he died nineteen days after the attack of epigastric pain. The autopsy was made by Dr. Samuel D. Gross, who found the first portion of the duodenum adherent for several inches to the anterior edge of the liver; on the upper wall of the duodenum, one inch from the pylorus, was a circular opening, six lines in diameter, with thick and well-defined margins. From this proceeded a fistulous track which ran outward along the anterior margin of the liver for about one inch and a half to a point midway between its outer border and the longitudinal fissure. Here, by an opening about five lines in diameter, it opened into a sac, capable of containing about twelve ounces of fluid, which, however, was perfectly empty at the time of examination. This sac was lined throughout by a thick layer of yellow, greenish lymph. It lay between the convex surface of the liver and the diaphragm, being walled in by inflammatory adhesions. The substance of the liver was healthy. The diaphragm was of dark color and deeply congested. The arch of the colon as well as that of the duodenum was adherent to the anterior edge of the liver. The coats of both tubes were perfectly healthy.

¹ Western Journal of Medicine and Physical Sciences, 1838, xi, pp. 510-514.

With this preamble, I proceed to the relation of my case, the history of which is as follows :

November 18, 1893. Frederick B., a boy, seventeen years of age, was admitted to my service in the Methodist Episcopal Hospital in Brooklyn, with the statement that his general health had been good up to a period about twelve weeks previously, when he began to suffer from pain in his abdomen, associated with tympanites and constipation. Irregular chills and fever with emaciation followed, with diffused tenderness over the whole abdomen. Finally, about two weeks before his admission to the hospital, a more severe pain with a manifest tumor, which was tender to touch, developed in the right inguinal region.

Upon admission he was emaciated and anæmic, the abdomen was flat, was somewhat tender, and with rigid recti muscles, but with no discernible tumor. His temperature was 99.6° F. ; pulse 100, and respirations 26. For some five days his temperature and pulse steadily declined towards the normal point. Then the temperature began to display a daily evening rise of from two to three degrees, and a dimly-outlined tumor below the umbilicus, projecting to the right of the margin of the rectus muscle, could be felt.

The abdominal cavity was now opened by a median longitudinal incision below the umbilicus. Normal-looking intestines and peritoneum came into view. Pushing the mass of small intestine to the left, and the ascending colon to the right, there was exposed behind the peritoneum, lying in front of the lumbar vertebræ, and over the great vessels, and projecting forward into the abdominal cavity, a flattened, irregularly heart-shaped tumor, whose base was lost under the transverse colon above, while its apex overhung the brim of the pelvis below where it was adherent upon the right side to the last portion of the ileum and the adjacent portion of the cæcum. A sense of fluctuation within it was elicited by palpation, and while this examination was in progress its wall gave way on its presenting convexity sufficiently to permit a few drops of puriform fluid to ooze out. The opening thus made was enlarged ; an ounce or two of brown puriform fluid escaped on the sponges ; the finger on introduction into the cavity felt several small solid masses, which, on removal with a scoop, proved to be pieces of partly-digested vegetable material ; the cavity evidently did or had recently communicated with the intestinal tract high up ; the exploring finger, passed upward, disappeared underneath

the transverse colon, and did not reach the upper limit of the cavity. All its relations pointed to the duodenum as the origin of the abscess.

From the first the general peritoneal cavity was protected by suitably-placed sponges; now the abscess cavity was irrigated out,

Hepatic Flexure
of Duodenum.

Pylorus.

Pancreas.

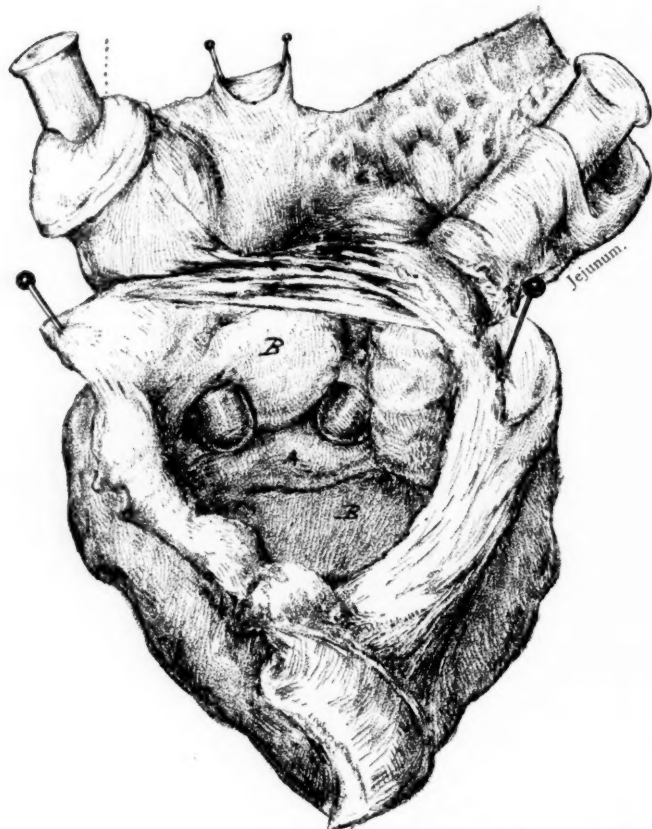


FIG. 1.—Pseudo-diverticulum of the duodenum. One-half actual size.
A. Strip of mucous membrane. B.B. Inflammatory connective-tissue wall. Test-tubes protrude into sac through the openings into it of the duodenum and the jejunum.

two drainage-tubes were inserted, and a suitable packing of iodoform gauze placed so as to continue the isolation of the abscess opening and the drainage-track from the general peritoneal cavity.

The patient rallied well from the operation; an abundant bilious

discharge from the drainage-tubes began at once to appear, and as soon as milk began to be administered, this also would escape from the drainage-tubes quickly after being swallowed. Infection of the general peritoneum was not prevented, and on the third day the patient died from the consequent peritonitis.

Post-mortem dissection showed the tumor to be formed of a thick-walled sac, its cavity holding about six ounces, broadening at its upper part, across the posterior surface of which part was traceable a band of normal mucous membrane, about one inch in width, which was continuous at either lateral angle with the proper intestinal canal. At the right upper horn the descending portion of the duodenum opened directly into the sac, pouting into it in a manner resembling the termination of the ileum at the ileo-cæcal junction. Just within the intact duodenum could be demonstrated the opening into it of the common choledoch duct.

The sac thus formed and related was a veritable interruption in the continuity of the intestinal canal, a large pocket or diverticulum, as shown in the accompanying figure (Fig. 1), into which all the ingesta transmitted by the stomach, together with the bile, was discharged by the duodenum on the one side, and from which it had exit on the other side into the jejunum. Minute examination of the innermost layer of the sac wall showed it to be composed purely of inflammatory connective tissue except along the limited portion mentioned above where the strip of mucous membrane was still visible. The line of demarcation between the mucous membrane and the inflammatory connective tissue lining was very sharp and well-defined.

Report of Pathologist.—Microscopic examination of the inner one centimetre of the wall of the abscess sac shows a condition of chronic inflammation. Sections of the nodules projecting into the tumor of the cavity, in its posterior wall, show them to be lymphatic tissue infiltrated with inflammatory cells. The larger part of the wall is made up of connective tissue in various stages of chronic inflammatory infiltration. Below a line horizontal to the lower border of the duodenum, at its entrance into the abscess cavity, the lining of the sac shows no trace of glandular or epithelium structure. The innermost layer of inflammatory connective tissue forms the lining membrane of the whole lower part of the cavity. Resting upon this is a layer of granular *débris*, and here and there patches of cells, some in a state of necrosis and others resembling young granulation-tissue cells. Infiltrating this granular material and

the loose superficial cells, but not penetrating into the deeper connective-tissue structures, are numerous colonies of cocci of various sorts. That portion of the lining lying superior to the above-mentioned horizontal line is elevated about three millimetres from the level of the surface below, and is thrown into perpendicular folds

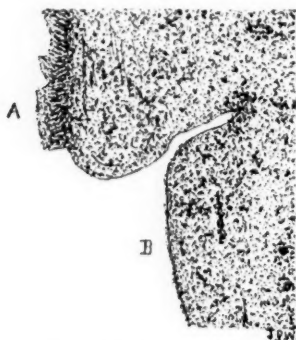


FIG. 2.— $\times 10$. Taken from wall of sac at the lower border of mucous lining. Showing elevation of mucosa, A.

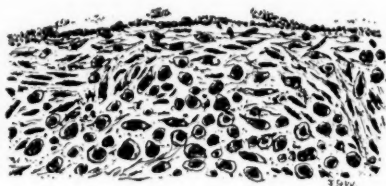


FIG. 3.— $\times 500$. Portion of wall of sac not covered by mucous membrane (B, Fig. 1).

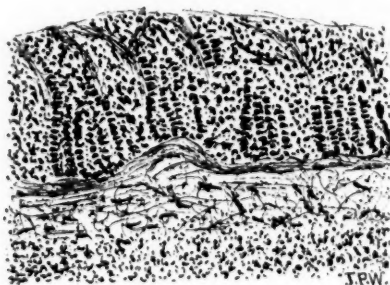


FIG. 4.— $\times 75$. Portion of wall of sac containing traces of mucous membrane (A, Fig. 1).

Sections through edge of mucosa and adjacent portion of the sac wall of inflammatory formation.

similar to the transverse rugæ within the intestine. Microscopic examination of this portion of the lining of the cavity shows it to be mucous membrane of the intestinal type, densely infiltrated with inflammatory cells, and lying upon a bed of connective tissue largely of inflammatory origin.

The etiology of such a condition as this must be a matter of interesting speculation. The most plausible theory is that which presupposes the occurrence of thrombosis of one of the duodenal arterioles, necrosis and digestion of the portion of the duodenal wall whose nutrition was thus enfeebled or destroyed, gradual invasion of the post-peritoneal connective tissue opened into by this process of ulceration, forming a sac with walls more or less thick, formed largely of inflammatory connective tissue. There was a manifest tendency of the limiting walls of the sac to thinning at certain points from distention and absorption. This had threatened a rupture at its apex near the cæcum before the admission of the patient to the hospital, but rupture had been prevented for the time by an adhesive peritonitis which had caused the ileum and cæcum to become adherent to it. This localized peritonitis had at that time occasioned symptoms simulating appendicitis. At the time of the operation it is evident that a rupture into the general peritoneal cavity was imminent at the point where rupture did occur when it was exposed and under examination.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, March 14, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

DISLOCATION OF HEAD OF THE HUMERUS WITH FRACTURE OF THE NECK.

DR. L. A. STIMSON presented a patient whose case was of interest in connection with the important paper by Dr. McBurney on Fracture of the Humerus with Dislocation. (Vol. XIX, p. 399.) This woman was brought to the New York Hospital in January last, shortly after having fallen down-stairs and injured her right shoulder. She was thin, and the region was not swollen. All the positive signs of anterior dislocation were easily recognizable. On manipulation broad, coarse crepitus could be easily got, and the outline of the greater tuberosity would be made to appear under the skin in front, while the head could be felt by the fingers in the axilla. The tuberosity could be felt plainly to rotate with the shaft, and with various manipulations of the humerus the upper end of the shaft could be felt to slide broadly and freely upon the head. There could be no question about the character of the injury. Having demonstrated beyond doubt the nature of the injury, he then abducted the arm, made traction upon it, and, with the fingers of the other hand in the axilla, pressed the head towards the socket; it slipped back into place without difficulty. A simple bandage was put on. The limb was confined to the side about six weeks. No traction was applied. When the limb was taken out of the dressing, three weeks ago, it was, of course, quite stiff, but under slight natural use the range of motion is increasing satisfactorily.

Since fracture of the anatomical neck (without dislocation) is admittedly an obscure injury, of difficult diagnosis, the reporter took advantage of the fact that after reduction he had an undoubted

fracture of that kind present to examine it for diagnostic signs, but he could obtain none. There was no recognizable deformity, no crepitus even when the arm was freely rotated and circumducted, no crepitus or displacement when the arm was forcibly pressed upward against the acromion, and independent mobility of the head upon the shaft could not be demonstrated. As the patient was under ether, subjective symptoms were, of course, unobtainable.

Nearly thirty years ago, Mr. Jonathan Hutchinson called attention to what he termed a late displacement following fracture of the anatomical neck, and through the tuberosities, a displacement simulating unreduced dislocation of the shoulder. He reported one case with autopsy, and said he had seen several others. Mr. Hutchinson explained it by assuming that the persistent tonic contraction of the scapulo-humeral muscles had tended to draw the arm up, thus pressing the shaft against the detached head so that the head was crowded inward and displaced inward and downward out of the socket, uniting subsequently with the bone at a level lower than it should have done. As far as the reporter knew, that is the only case of the kind which has been reported, and it has been quoted and requoted many times since. But since in the present case forcible pressure on the humerus upward seemed to have no effect whatever in producing such displacement, he was led to ask himself whether, in Mr. Hutchinson's case, there was not an error of interpretation, and that the permanent traction during repair which he recommended is not unnecessary.

EPITHELIOMA OF TONGUE; EXCISION; NON-RECURRENCE.

DR. R. ABBE presented a man, forty-five years of age, from the dorsum of whose tongue he had excised an epitheliomatous mass nine months before, the parts having healed perfectly and no relapse having yet taken place. The mass had occupied about one-third of the dorsum, half way back; did not seem to be very deeply embedded, and was surrounded by an area of ichthyosis. As the tumor was proved to be malignant, the question arose whether he would be justified in removing only the diseased portion instead of extirpating the entire tongue. As the man depended upon speech for a living, and preferred to let the disease take its course to being deprived of that faculty, Dr. Abbe decided to simply take out the greater part of the dorsum. Cutting deeply into the muscle by a boat-shaped incision, the edges of the wound were then brought together. The result had

been perfect, the man had free use of the tongue, and there had been no recurrence of disease. The remnant of the tongue had spread favorably to its use, as had been expected. The lingual arteries had been tied in order to lessen the danger of dissemination and hæmorrhage.

Dr. Abbe also showed photographs of an exactly similar case of epithelioma of the tongue seen four years before. The man refused an operation, and died after three months.

SARCOMA OF THE TONGUE. NO RECURRENCE AFTER NINE YEARS.

Dr. Abbe showed a man from whom he had removed a sarcoma of the tongue when he was seventeen years of age, being nine years before, and there had been no recurrence. At the time of its removal the mass had been growing some years, was solid, as large as the end phalanx of one's thumb, and buried in the dorsum of the tongue. A photograph taken before removal was also exhibited. The tumor was taken out under cocaine anæsthesia. Removal was painless and thorough, and included the capsule. Microscopical examination was made by three pathologists,—Dr. Hartley, Dr. Elliot, and Dr. Fergusson. Dr. Hartley regarded it as angeiosarcoma, the others as pure sarcoma. In answer to an inquiry, Dr. Abbe stated that ordinarily he did not ligate the linguals in simple removal of the tongue, but, considering the form of the operation in the present case, he thought it wiser to ligate them.

Dr. GERSTER stated that he had operated for neoplasms of the tongue in many cases without ligating the linguals. The past three months he had had four cases, three of epithelioma, one of sarcoma, and a number in the past in which he had resorted to Whitehead's method. Formerly he had been accustomed to ligating the linguals, but found in some instances that the procedure was a difficult and tedious one, involved a good deal of time, prolonged anæsthesia, and when accomplished it did not entirely control hæmorrhage. In the four recent cases the union was speedy and perfect. The tongue had been drawn out by several strong silk threads passed through it, the patient's head was somewhat dependent from the side of the operating table, bleeding points were ligated at once as the tongue was extirpated.

Dr. WYETH, having once heard the late Dr. Sands remark that hæmorrhage could be controlled by making a good deal of pressure

at the base of the tongue with the finger, had not tied the linguals since that time. It was almost always unnecessary and tedious, not, however, because the vessel was irregular in distribution, for he had not found it so in the dissections which he had made.

ANALYSIS OF ONE HUNDRED AND SEVENTY CASES OF CANCER.

DR. L. S. PILCHER read a paper with the above title. (See page 1.)

DR. ABBE thought the analysis made by Dr. Pilcher of so large a number of cases of cancer admirably adapted to provoke thought regarding the best way in which to meet this disease. When our late member, Dr. Sands, was called upon in the last years of his life to operate upon cancer of the breast he frequently refused, because the disease had reached a stage where the results of interference were so discouraging. And even to-day it seemed that the records were very discouraging regarding recurrence in most forms of the affection. A practical point to bear in mind was the fact that there had been some improvements in the statistics dependent largely upon two things. One was, more extensive or radical removal of glandular structures adjacent to the cancer. This led to the view, which seemed to him the correct and accepted one, that it was essentially a local affection, and, therefore, the more thorough its removal the better the chances of life. On the other hand, against the improved statistics of non-recurrence following extensive removal was the mortality due to the major operation which extensive removal implied. In cases of cancer of the surface, especially of the larynx and upper extremities, results of recent experience gave encouragement, but in cancer of the abdominal viscera there had not been much improvement. As long, however, as cancer had come to the human race, surgeons would be called upon to remove it, and would be compelled sometimes to operate upon unfavorable as well as upon favorable cases, in the growing hope of improving the technique and statistics.

He thought it would be proper in discussing the paper for each member to give the results of his individual experience with cancer, or cancer of some part, as the breast. It seemed to him that the most frequent direction of recurrence had been in the skin area, and in his own experience it had been more frequently on the lower side of the incision than elsewhere. Recurrence in the axillary glands had been comparatively rare. The same was true of the supraclav-

vicular glands, when there had been complete axillary removal, a fact which showed the necessity for much wider removal.

He thought a point to which the attention of the profession should be called was that in a certain number of cases recurrence took place a great deal quicker than in others, and they ran a more aggravated course than apparently they would have done had they been let alone. Such a case was one in which he had that day removed a secondary very extensive cancer of the neck, following laryngectomy four weeks previously for a not as yet advanced cancer of the larynx. Surgeons should be very chary about operating upon every case of cancer which might come to their attention, otherwise they might bring discredit upon the treatment, and lead patients to remain away until too late, instead of seeking relief early in the disease. The respect of the community could be commanded better by refusing to operate upon certain advanced cases, while at the same time impressing the fact that patients who came early enough should always be operated upon.

DR. JOSEPH D. BRYANT thought there were two lessons which the paper taught very conclusively. The first had been emphasized somewhat forcibly by the author,—namely, the importance of inculcating in the minds of patients, people, and physicians the careful surveillance of all tumors, no matter of what nature or origin. He regarded that and the prompt removal and repeated removals of every point of recurrence as the two leading factors which would enable surgeons to reduce the mortality in connection with malignant disease. He had understood that about seventy-two of the cases related in the paper were inoperable because of the extent of the disease when the patients were first seen. There could be no doubt but that this number would have been much smaller had the patients, friends, and family physicians been impressed with the rule just mentioned, that all tumors of whatever nature should be kept under the strictest surveillance.

The paper also impressed the fact that in cases similar in every regard, so far as the surgeon could determine, including age and extent of the tumor, rapidity of return of the growth varied. He thought we had to look to a considerable extent to the personal peculiarities of patients regarding their susceptibility to malignant disease in explanation of the fact that some remained well after operations, while others, apparently as favorable, had an early recurrence.

DR. WYETH hoped to hear from the members the length of time their patients had lived without relapse after removal of cancer, say, of the breast. As the reader of the paper had said, we all felt that the record of our operative measures in carcinoma was discouraging. In his own experience but two patients had lived any considerable time after removal of carcinoma of the breast. One was that of a lady, thirty-eight years of age, who was operated upon in 1879 by Mr. Pollock, of London. Six months afterwards Dr. Wyeth operated for recurrence *in loco*, in 1880 for second recurrence the size of a small egg in the edge of the wound. The last time he saw the woman was six months ago, and she was then still in perfect health, without a sign of recurrence, nearly fourteen years after the last operation. The tumor had been carefully examined in the laboratories of the city, and was, without doubt, carcinoma. His second best case was operated upon in 1887, the patient remaining well until one year ago, when slight recurrence had taken place. She refused further interference, and was now moribund.

The average length of life after operation in his cases had been a few months to two years, very few patients, however, having reached the end of the second year. A very excellent surgeon in the city remarked to him recently that he had never seen a case of carcinoma of the breast with involvement of the axillary glands which had lived any length of time after operation without recurrence, and this had also been Dr. Wyeth's experience.

DR. L. A. STIMSON thought the likelihood of a radical cure of a patient suffering from carcinoma was not the only reason for operative interference. The surgeon had other duties where he was unable to cure his patients. The tone of the paper might, perhaps, lead one to suppose that recurrence after operation meant failure, yet in many cases the fact of survival and a life spent with comfort until recurrence took place meant success. While he had himself understood that the object of the paper was to lead people to apply more promptly for relief from suspicious tumors, yet he thought the point might be made a little clearer lest that object should be defeated and the statistics be quoted against surgical interference.

Where patients came with carcinoma of the breast, the most common locality for the disease, he thought the surgeon should operate even though he felt pretty sure that there would not be many years survival. He should operate to relieve the symptoms which naturally occurred during the evolution of the disease and which were extremely

painful to bear. If the rule were always observed to follow out and remove the axillary glands, whether felt to be enlarged or not, it would lead to better collective results, and would do away, according to his experience, with the painful swelling of the arm which so often took place where the axilla was not cleaned out.

Another advantage of removal of cancer in certain localities, say of the breast, was the fact that, if it should not lead to radical cure, the recurrence would be likely to take place where it would be less painful and distressing to the patient. It would be an advantage to have cancer of the breast removed and die one or two years afterwards ignorant of its recurrence in one of the viscera.

Bearing on Dr. Wyeth's question, asking for testimony as to the length of survival after operation, Dr. Stimson said that fourteen years ago a lady came to him with cancer of the breast in such a state that he could not advise an operation, but at the husband's request he removed it for the moral effect. Ten years afterwards the woman came back with a recurrence as large as the tip of one's finger, which he removed, and she had remained well since, more than three years. The specimens had been examined by the pathologists of the hospitals and pronounced cancer. In a case of distinct epithelioma of the rectum, which he removed in the case of a physician about 1878 or 1879, there had been no recurrence the last time he had heard from the man, twelve years after the operation.

DR. PILCHER closed the discussion by saying that, to his mind, if the paper possessed any merits at all, it was in the fact that it set forth a plain, unvarnished statement of all cases of cancer treated at one institution during a certain time, and gave a fair view, he thought, of the kind of material surgeons were called upon to deal with. A very large number of the cases were frankly inoperable, and in many others, although operated upon, the disease was so extensive that a part of it had passed beyond the reach of the knife, facts which ought to emphasize even more positively than had been done, if that were possible, the necessity for early interference in all neoplasms of suspicious character. He wished to make that point clear, if he had not already done so. A large number of cases which seemed to afford some hope of success had really proved themselves to belong to the inoperable class of cases, but since it was impossible to judge by any means of investigation yet at command that they would not prove successful, surgeons had to take the chances and operate.

As to statistics of the results of the removal of cancer, although

they often gave a considerable proportion of apparently permanent cures, yet these cures, however, as years went by became fewer and fewer, so that after the lapse of four, six, or fourteen years there remained very few cases in which the disease had not recurred or reappeared. In one of his cases of cancer of the breast in which there had been no relapse after three years, it was interesting to note that in this patient, nine years before, a tumor, supposed to have been carcinomatous, had been removed from the breast by caustics. In another case, not included in the hospital list under review, he had removed a carcinomatous breast. A few months afterwards the axillary glands, which had not been removed, enlarged, and he extirpated them. Then the patient remained well six years, but finally died of malignant disease of the liver. He cited also the case of a man whose trouble began with epithelioma of the lip. After this was excised he soon developed glandular enlargement in the neck, which in turn was operated upon; then disease in the cheek, which was removed; finally he came under Dr. Pilcher's care with extensive recurrent disease of the cheek. This was again widely excised, and now five years had passed without any further recurrence. In recalling individual cases of this kind, one found much to encourage him in surgical treatment, especially where the patients came under observation early.

TUMOR AT FORAMEN CAECUM OF TONGUE; THYROID GLAND.

DR. CHARLES A. POWERS read the history of a case, from which he presented microscopic slides, as follows: Mrs. K., aged thirty-one, two years ago had temporary loss of voice. Two weeks ago again lost her voice. Examination by a laryngologist revealed a tumor the size of a plum at the base of the tongue, in median line and on level with the epiglottis. The tumor was rounded and hard at the edges, softer in the centre. May 17, 1893, removal, by Dr. W. T. Bull, growth encapsulated, shelled out. January 1, 1894, small tumor at the site of the former operation. This removed and found to have same histological features as first growth.

Dr. Frank Ferguson, pathologist to the New York Hospital, made the following report upon the specimen: The tumor is spherical in shape, measuring 2.5 centimetres in diameter. It is limited by a fibrous capsule, except on one side, where an area one centimetre in diameter is covered by voluntary muscle-fibres.

Microscopically it is found to be thyroid-gland tissue, many of

the acini of which are distended with colloid material. There are also numerous areas of pigmentation from old hæmorrhages, and many extensive recent hæmorrhages, together with many extensive areas of small round cells of inflammation.

Dr. Powers said that there exists in the foetus a duct between the thyroid gland and the foramen cæcum, and along the course of this duct (thyro-lingual) in the adult thyroid-gland tissue is occasionally found.

Butlin had found in two cases that partial removal hastened growth of the remaining part, then it again diminished in size. In the case which he had reported the second tumor doubtless occurred in some thyroidal tissue which had been overlooked at the first operation and which afterwards grew rapidly. Similar cases have been reported by Wolff, Bernays, and others, but there appear to be very few recorded.

Stated Meeting, March 28, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

MECHANICAL APPLIANCE FOR CORRECTION OF DEFECT
AFTER REMOVAL OF HALF OF THE LOWER JAW.

DR. CHARLES MCBURNEY presented two patients illustrating the use of a mechanical appliance to correct defect after removal of half of the lower jaw. (See page 35.)

RESECTION OF VESICAL END OF URETER FOR TUMOR
OF BLADDER.

DR. WILLY MEYER presented a patient, a man forty-three years of age, who first experienced trouble in passing water at the beginning of 1891. His chief complaint then was of continuous pain while making water and slight tenesmus at the end; the last drops were pure blood. He had been treated almost a year and a half for catarrh of the bladder and inflammation of the prostate when he came under Dr. Meyer's observation. At this time he was able to pass water easily, in a good stream; no blood, but a kind of milky fluid at the

end. The prostate was not enlarged. It was slightly painful on pressure. The bladder easily held a pint of water.

Cystoscopy was performed, and Dr. Meyer was not much astonished, in view of the history, especially the passage of pure blood at the end of micturition, to find a tumor of the bladder, but he was surprised to find so large a one. The cystoscope could be pushed back towards the fundus for fully two inches, and still the tumor was visible. The mouth of the left ureter could easily be seen. That of the right one was invisible. From the left ureter came perfectly clear urine. At one side of the tumor near where the right ureter should enter the bladder, a small amount of turbid fluid escaped at intervals. It was concluded that the tumor involved and compressed the ureter, and had probably led to pyelitis.

Suprapubic cystotomy was done February 16, 1893, the transverse incision being employed as was his custom. As soon as the bladder was opened, the same condition was seen as with the cystoscope. A tumor of apple size came into view. The mouth of the left ureter was readily distinguished, while that of the right was invisible. The tumor was partly shelled out and partly cut out, employing the Paquelin cautery and scissors. The patient made a good recovery, and when presented appeared in excellent health.

Examination of the tumor showed that two inches of the lower end of the ureter, in fact the entire part of it that traversed the bladder-wall obliquely, had been excised with it. It formed a part of the large basis of the tumor. Dr. Meyer had expected subsequent occlusion, or at least cicatricial constriction of the divided ureter to take place after a time, but fortunately it had not. A tumor is not palpable in the right lumbar region to-day. Cystoscopy performed again seven months after the operation showed a large scar at the site of the excision, and escape of urine out of an oval-shaped, irregular hole in about the centre of the scar. The urine, however, was purulent, and confirmed the original diagnosis of pyelitis. The abdominal wound had been allowed to heal by granulation, which left in these cases a scar less liable to the occurrence of hernia, he thought, than where stitches were introduced and primary union of the skin obtained throughout.

DISARTICULATION AT THE HIP BY JOURDAN'S METHOD.

DR. R. ABBE presented a woman illustrating the admirable result of the Jourdan method of amputation at the hip, but also showing

the difficulty instrument-makers found in fitting a serviceable limb in many such cases. The fleshy stump, the bone having been shelled out, was the longest that could be made by that method, was muscular and entirely under the control of the patient, but the artificial limb made for her had caused too much pain for use. The operation had been done for sarcoma of the lower end of the femur one year before.

OLD DISPLACEMENTS OF THE UPPER END OF THE FEMUR, AND THEIR TREATMENT.

DR. CHARLES T. POORE read a paper with the above title. (See page 27.)

DR. C. MCBURNEY said with regard to congenital dislocation of the femur that operative measures offered no hope of forming an acetabulum in which the head of the femur could be retained. He had operated in two cases, but the head of the femur slipped out as soon as the fixation apparatus was removed. The patients acquired use by experience, which surpassed any that could be offered by operation or mechanical appliance.

DR. VIRGIL P. GIBNEY had not understood the reader to mention any cases of congenital dislocation of the hip, rather those only of accidental displacement, and to them he thought his remarks were very pertinent. In no case of accidental displacement during the course of disease, as during confinement to bed for some time on account of deformity, had he succeeded by operative measures in permanently retaining the limb in the corrected position. As the author had stated, after the lapse of two or three years the head of the femur was found again out of place. He agreed with Dr. Poore, that if anything was done it was best to resect the head of the bone and not attempt to hold it in place. This was the rule. He had some exceptional cases,—cases which he hoped soon to present before the Society,—in which he had obtained excellent results.

The members would recall a case presented about a year ago by Dr. Gerster, a boy who had sustained dislocation at the hip-joint which had been reduced by the bloody method. There was also paralysis of the perineal group of muscles. This boy had drifted into the Hospital for Ruptured and Crippled a few months later, when Dr. Gibney cut down in the old scar left by Dr. Gerster's operation and found the head of the femur displaced. He scraped out the acetabulum again, took precaution to get a little deeper socket, replaced the femur, and held it in the corrected position. After a long

process of suppuration, healing took place, and the boy the past eight months had had the limb in good position. There was no shortening. The patient had since been undergoing treatment for the peripheral paralysis.

Dr. Gibney also mentioned a case of "flail hip," similar to one of the cases reported by Dr. Poore, which he had not published because it was too early to speak of the ultimate result. The boy was six years of age; the "flail hip" had resulted from an acute arthritis during childhood; the headless femur could be felt under the gluteal muscles; the shortening in this position amounted to two or three inches. Dr. Gibney cut down and chipped out two exostoses filling the acetabulum, replaced the headless end of the femur, left the dressing on eight or nine weeks, got good union, withdrew the nails and curetted their tracks. A small abscess formed in one of these, which made it necessary to replace the dressing for several weeks. At a recent examination a strong joint was found; there was not more than an inch shortening. Whether "flail hip" would develop again after two or three years he was unable to say.

Regarding congenital dislocation at the hip mentioned by Dr. McBurney, Dr. Gibney said that last fall, when in Würzburg, he had opportunity to see some of Dr. Hoffa's cases, six or eight in number, which had been operated upon from six weeks to a year before, and the results seemed surprisingly good. Dr. Hoffa had seemed to have little trouble in making an acetabulum and holding the femur in place, but he operated upon cases not more than five or six years of age. After the fifth or sixth week various passive movements were begun. Dr. Gibney had not yet obtained quite so good results from this method.

Dr. B. F. CURTIS related a case of pathological dislocation successfully reduced by operation. A boy of seven or eight years was brought to St. Luke's Hospital with a history of having been ill two or three weeks with a large hip abscess. He was operated upon and the head of the femur resected. Two or three weeks afterwards the other hip suddenly filled with a large abscess, and the head of the femur slipped out upon the dorsum ilii. When Dr. Curtis cut down upon the joint, letting out about half a pint of pus, he was surprised to find no evidence of bone-disease. He replaced the head of the femur in the acetabulum, and put on an extension apparatus. The wound healed rapidly, the bone remained in place, and after several weeks a movable joint was obtained. The joint first diseased healed by ankylosis.

SPECIMEN OF ANTHRAX BACILLUS.

DR. R. ABBE presented specimens of anthrax rods and spores under the microscope, and also photographs of the patient, a man who had been brought to St. Luke's Hospital the week before with a spot on the neck beneath the right jaw, about an inch in diameter, which looked like an ill vaccination-mark. It was a raised, hard patch of purple-brown, surrounded by a row of vesicles; outside of that was œdema two and a half by three inches wide, and cellulitis running up under the chin and down on the chest to the nipples. Even a serious vaccination would hardly account for the condition, so that anthrax was at once suspected, and the bacilli in quantity were found in serum taken from the vesicles. The sore had begun as a pimple upon the neck which was cut by the razor while shaving, three days before admission, and from that time it had grown worse. The patient showed considerable depression: temperature $103\frac{3}{4}^{\circ}$ F., pulse only 80. As soon as possible the central area, including all the œdematous portion, was excised, but it was impossible on account of its extent to remove all the affected cellular tissue. The wound was packed with iodoform gauze. Two long incisions were also made through the cellular tissue and packed with gauze. The temperature fell at once to nearly normal, and there was such improvement by the next morning that it was supposed the man would recover. The following night, however, there was a change, the temperature slowly rose to 102° F., twenty-four hours after operation, and five hours later delirium set in, active delirium followed rapidly by a typhoid state with coma and high temperature, reaching $106\frac{1}{2}^{\circ}$ F. The man died forty hours after excision. At the time of the operation cultures from the blood at the margin of the cellulitis, ten inches from the infection, showed anthrax, and blood from a prick of the finger also revealed bacilli. Before death blood from the finger was found swarming with anthrax. The case showed that it was not always possible to check the disease by excision of the infected area, although it had been done in a number of recorded cases.

DR. W. W. VAN ARSDALE said that a very simple method of making the diagnosis of anthrax where the bacilli could not be found in or about the pustule was to inoculate mice with a drop of the serum from it. When house-surgeon he had applied this method successfully in three cases. The patients were let alone, no operation was performed, and all recovered. It had been recently shown that pus was destructive of anthrax bacilli, and it seemed to Dr. Van Arsdale that

it was a better and simpler method to cure the patient by letting the sore go on to suppurate and thereby destroy the anthrax bacilli than to inject corrosive sublimate solution around the diseased area or to make incisions, and by these methods risk further inoculation of the disease-germs.

DR. JOHN A. WYETH mentioned a recent case which he believed to be one of malignant pustule, although the diagnosis was not confirmed by examination for anthrax bacilli. It began as a short scratch on the face about ten hours before he saw the patient. Pain developed, the lymphatics enlarged just in front of the ear, the man had a chill, and all the symptoms of rapid infection ensued. Dr. Wyeth cocaineized the parts, made free incisions, injected a solution of bichloride (1 : 3000) through the whole cheek, and applied a poultice of flaxseed moistened with bichloride solution (1 : 5000); the relief was almost immediate. The diseased area sloughed out and the patient was practically well in five days. Dr. Wyeth thought it good treatment to inject a solution of bichloride to kill the disease-germs; but in order to insure success he thought it essential to see the case in the first few hours of infection.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, April 2, 1894.

The Vice-President, DR. JOHN B. ROBERTS, in the Chair.

FREEDOM FROM RECURRING APPENDICITIS AFTER EVACUATION OF THE ABSCESS AND RETEN- TION OF THE APPENDIX.

DR. JAMES M. BARTON reported the results of fourteen operations for appendicitis in which the appendix was not removed. These were all cases of ruptured appendix with circumscribed abscess, with no general peritonitis and no symptoms of obstruction.

The operation consisted in opening the abdomen and using sterilized cheese-cloth to hold the movable intestines back and to protect the general peritoneal cavity while the abscess was opened and emptied. Drains were then introduced, some of the cheese-cloth permitted to remain, and most of the wound closed. No attempt was made to find or remove the appendix.

All on whom he had operated in this manner had recovered, and none that he was aware of had had any trouble with the retained appendix since.

The mortality had been much greater when he had removed the appendix. He thought it quite likely, in these cases, that the opening from the appendix into the intestine was closed early in the attack,—closed quite as firmly as any ligature would close it, leaving but little probability that faecal matters would ever be again able to enter the appendix either to cause a faecal fistula to follow the operation or to start another case of appendicitis in the future.

If it were not firmly closed, the pus would never have broken through the walls of the appendix, or, having broken through, the resulting abscess would not have increased in size, but would have emptied itself through the appendix into the bowel.

He had observed, in several cases where fæcal fistula followed appendicitis, that in none did the fæces make their exit through the appendix, but through other portions of the intestines, showing that the inflammatory deposit closing the appendix was even stronger than the healthy bowel.

The mortality following operations for appendicitis is mainly due to general septic peritonitis and to intestinal obstruction.

If we will look into the cavity of a fully-developed abscess, such as we have been considering, we can readily see how these complications may follow the search for or removal of the appendix. The cavity of the abscess is lined with a thick layer of grayish, poorly-organized, aplastic lymph, filled with micro-organisms. The appendix lies buried beneath this lymph, and its cavity communicates freely with the general abscess cavity. The opening can occasionally be seen, and is often the only guide by which the position of the appendix can be recognized.

To tear up this fragile and infected lymph, and distribute it through the peritoneal cavity while searching for and liberating the appendix, would greatly increase the probability of establishing a general septic peritonitis.

Intestinal obstruction following operations for appendicitis is probably due to kinking of the recently separated intestines. As they reunite, covered and stiffened as they are by inflammatory deposits, they cannot adjust themselves as readily as at the first formation of the abscess.

It is only in cases of circumscribed abscess that he had been permitting the appendix to remain.

When the appendix is still unruptured, or when it has ruptured and general peritonitis has occurred, or when obstruction is present, he removed it.

DR. THOMAS R. NEILSON had had several cases in which he had followed the practice of not attempting to search for the appendix in a condition of acute abscess. He thought it safer to leave the appendix alone, and if it does not cause further trouble it would be bad surgery to go in and disturb it.

DR. JOHN B. ROBERTS felt inclined, as a rule, not to search for the appendix if there was a large abscess. In some cases he preferred to make the opening in the lateral aspect and drain in that way. Whether or not these cases are permanently cured he was unable to say.

DR. WILLIAM W. KEEN, as a rule, removed the appendix. He thought it bad surgery to leave the appendix unless the adhesions were very marked and could not be separated without the risk of harm. Where there is liability of breaking into the general peritoneal cavity he would not search for the appendix. Where there is a tumor he would make the incision over the tumor, and not go through the peritoneal cavity. It is rare to have an appendicitis going on to a condition of distinct tumor without pus being present. He would much rather operate before any appreciable tumor had formed. In cases of tumor he almost invariably operated even with a normal or a declining temperature.

THE SURGICAL RELATIONS OF THE THORACIC DUCT IN THE NECK.

DR. JOHN H. BRINTON presented dissections illustrating the two most common terminations of the thoracic duct. From the study of several dissections, and especially from the comparison of the descriptions given by various anatomical writers, he had found great diversity as regards the termination of this duct. The general law is that the duct shall discharge its contents into the great veins, jugular and subclavian, at the base of the left side of the neck. This is done in several ways.

The first of the dissections presented exhibited the regular or normal type, the duct curving over the apex of the pleura and terminating exactly in the angle formed by the junction of the subclavian and internal jugular veins. In the second dissection the duct divided into two branches, these forming a circle by their union above. From this circle one trunk arches outward and divides into three branches. Two of these empty into the subclavian at the distance of one-quarter and one-half an inch from the internal jugular junction. The third branch empties into the internal jugular. Between these divisions passes a communicating branch. A large branch is also given off from the right side of the circle. This passes upward, turns to the left, and, deeply seated, crosses the neck transversely. The last portion of this branch was uninjected.

From the examination of these dissections the two typical terminations of the thoracic duct as described by Meckel can be studied. In most cases it empties into the angle of union of the internal jugular and subclavian veins by one trunk; when more than one trunk exists,

the terminations of the thoracic duct are in both the internal jugular and subclavian veins. The duct, as stated by this observer, rarely opens into only one of these two veins.

According to Quain, the thoracic duct often divides into two or three branches, which terminate separately in the great veins, as in the second dissection. Sometimes these several ducts again unite in a common trunk, and occasionally one of the branches may pass across and empty into the veins of the right side of the neck. The duct has also been known to terminate in the vena azygos. According to Sappey, there are many varieties of termination. Professor Harrison Allen states that the thoracic duct may empty into the jugular, azygos, and left innominate vein; infrequently it may be double. Sometimes as many as six terminal vessels are present, which are received into the subclavian, jugular, vertebral, and axillary veins.

The irregular terminations of the thoracic duct are alluded to by Henle and by Breschet. The latter, in his *Système Lymphatique*, describes minutely the many varieties, and instances one case, cited by Haller, from Bartholin, of the communication of a duct branch with the vena cava.

The formation of circles, or *insulæ*, is also referred to. The multiple termination of the duct is frequently met with in animals.

Hyrtl states that the varieties of termination of the duct are very numerous, and do not in the least interest the practical surgeon. The latter remark is too sweeping, especially in those cases where any portion of an arch formed by irregular terminal branches reaches high into the neck. If drawn upon or stretched by contracting and indurated tissues, and during operation, it might be easily cut or torn. In an instance where a duct branch passes transversely for a considerable distance to empty into the subclavian vein it certainly might be readily endangered. It seems, therefore, that the possibility of irregular and manifold endings of the thoracic ducts must be considered by the practical surgeon, and that in operating in this deep-seated, dangerous region he should bear in mind its normal abnormalities.

OPERATION WOUNDS OF THE THORACIC DUCT IN THE NECK.

DR. WILLIAM W. KEEN said that when we consider the frequency with which operations are done on the left side of the neck,

in the vicinity of the junction of the jugular and subclavian veins, for the removal of enlarged glands, for tumors, for goitre, etc., and of stab and other wounds, it is surprising that there are not a number of instances of wounds of the thoracic duct. The danger of wounding it may be greatly increased by the fact that Dieterich (Henle's *Anatomy*, 1876, III, 453) has found the arch of the duct as much as five and a half centimetres—over two inches—above the top of the sternum, and touching the thyroid gland. Yet so far as his investigations had gone he had only been able to discover two cases of wound of the cervical portion of the duct reported in surgical literature. To these he could add two more, one of his own, and another, the notes of which had been furnished him by Dr. A. M. Phelps, of New York.

Even in war, wounds of the duct in any part of its course are practically unknown. In neither the Italian war of 1859, the Crimean war, nor our own late civil war, is there a single instance recorded.

CASE I.—(Cheever, *Boston Medical and Surgical Journal*, 1875, p. 422.)—Tumor of the neck, during the removal of which "the subclavian vein and a large vessel near the internal jugular were both wounded. A transparent, viscid, coagulable, and colorless fluid ran out from the tumor and from the lower corner of the wound in quantities as large as an ounce at a time, some six separate times." The inner two-thirds of the clavicle were then removed. "The subclavian artery was sought and pushed aside, and an aneurism-needle passed between it and the vein, first out towards the shoulder, and a ligature tied; and second, close to the sterno-clavicular articulations where the needle and ligatures surrounded the venous trunks at or upon their junction in the left vena innominata. The artery was not wounded nor tied. All bleeding ceased, but the transparent fluid still oozed out moderately. The wound was lightly packed with sponges and ferric alum; no hæmorrhage occurred, and the transparent fluid did not soak through the sponges." The patient died from shock and exhaustion, thirty-six hours after the operation. A *post-mortem* examination of the wound showed the subclavian vein tied externally, and also at the junction of the internal jugular and subclavian. The remains of the tumor extended two inches below the clavicle, but were enucleated without piercing the pleura. This fragment of tumor had incorporated into itself several venous trunks or sinuses caught and entangled in the gradual agglomeration of glands. There was

no opening into the pleura, no sac running down into the thorax or axilla, no cyst in any direction. The source of the transparent effusion could not be traced. There would seem to be but little doubt that this fluid was lymph from a large branch of the lymphatics in the tumor, or more probably from the thoracic duct where it arches over to join the left subclavian vein. In contact with, if not surrounded by, the glandular enlargement, its thin and transparent walls were readily wounded in trying to remove the lower part of the tumor. No other source for the clear fluid could be found, there being neither cyst, hydrocele of the neck, nor pleural effusion to account for it. The fluid under the microscope exhibited no cells save a few stray blood-corpuscles. The patient having fasted for twelve hours before the operation, there would be little, if any, of the milky emulsion of chyle in the duct.

"The fluid poured out of this wound coagulated after contact with the air in a firm jelly, just as blood coagulates. This, no doubt, was due to its fibrin. Its large quantity pointed to a considerable duct as its source, although it must be borne in mind that the whole lymphatic system of the neck was probably vastly enlarged, and secreted great quantities of lymph."

CASE II. (Boegehold, *Archiv für klinische Chirurgie*, 1893, Vol. XXIX, p. 443.)—In March, 1880, Wilms extirpated a tumor as large as a fist from the left side of the neck of a stout man, forty-five years of age. In the course of the operation Wilms gradually neared the junction of the subclavian and jugular veins. As he was carefully scraping the tissue with a sharp spoon, suddenly there poured out over the operation field a stream of whitish fluid the diameter of a straw, which mingled with the rather freely-flowing blood. This fluid could not well be anything else than chyle, for a wounded lymph-vessel would have given exit to a clear, or at the most a slightly yellowish, but not whitish, fluid. There was no abscess nor any purulent pleurisy. After this wound of the thoracic duct, the extirpation of the tumor was terminated at once. The milky fluid no longer escaped, and on account of the considerable hæmorrhage the idea of securing it in the depth of the wound was abandoned. The wound was then packed with salicylic wool, and an antiseptic bandage applied. The packing was removed the next day without any further appearance of the chyle. The patient recovered without incident, and six months afterwards died, presumably from pulmonary metastasis of the carcinoma.

CASE III. (A. M. Phelps, of New York ; personal communication.)—June 4, 1893, at the Mary Fletcher Hospital, Burlington, Vt., Dr. Phelps operated on a malignant tumor of the left side of the neck. "It was found that the jugular vein passed through the tumor, and this necessitated the removal of three inches of the jugular, near its junction with the subclavian. The tumor extended downward underneath the subclavian vein and involved the deep muscles of the neck. The wound was dressed four days later. There had been a constant profuse discharge, which at first was supposed to be serum, but its color, like that of skimmed milk, and its source from a single point in the wound, as well as its quantity, soon forbade that presumption. He estimated that about three pints a day had been lost. It was sufficient to saturate daily ten or fifteen ordinary bed-sheets folded in a number of thicknesses, in addition to saturating the surgical dressings. The man rapidly lost flesh. The point of a probe, the size of a large knitting-needle, inserted at the point of evacuation entirely stopped the discharge. The point from which the liquid issued was caught by forceps, which were allowed to remain in place three days. The patient gained a pound a day after the discharge was stopped, and made an excellent recovery."

CASE IV.—DR. KEEN, in the course of an operation upon a girl of twenty years for extirpation of a mass of tubercular glands above the left clavicle, had exposed both the left internal jugular and subclavian veins, but not to their junction. While carefully dissecting adhesions away he made a small opening in what was apparently an adhesion, when instantly there welled out from it a perfectly limpid fluid. Since the fluid escaped continuously and with a very evident respiratory rhythm, and apparently flowed from a tear one-fourth of an inch in length, from a tube about one-eighth of an inch in diameter, he concluded that he had opened either one of the dilated left lymphatic ducts just before their entrance into the thoracic duct, or, more likely, the thoracic duct itself. About two ounces of fluid escaped in all. A little of it, sucked up with a hypodermic syringe, coagulated in a few minutes. A grooved director, introduced into the tube from which the fluid was escaping, only entered about one-half to three-quarters of an inch, when it met some obstacle. Having closed the opening by the pressure of one finger, the removal of the glands was completed. Then he seized the two edges of the opening with forceps, and by means of a fine semicircular needle and fine silk closed the wound. Some little leakage still took place. There was

also a little of a similiar fluid from the upper part of the wound, but it seemed a general oozing rather than from any distinct vessel.

A drainage-tube was inserted into the wound, but was removed after five hours. During this time the amount of wound-fluids was very large for so small a wound, amounting to nearly a pint, and its light color showed that the small amount of blood was diluted with a great deal of clear fluid. The dressing the next day was partially saturated by probably an ounce or two, and after that was dry.

On the eighth day after the operation, having made an absolutely uneventful recovery, she went home. Not the slightest evidence of trouble appeared in the wound in the neck, neither swelling, redness, nor pain. Her weight on December 11, four days before the operation, was 106 pounds, and eight days after it, in about the same clothing, 103 pounds. Her highest temperature was 99.8° F., on the evening of the operation.

In the fluid there were many lymphocytes or lymph-corpuscles of different sizes; some few were slightly granular, and there were many fat- or oil-globules, small in size, but large in number. The macroscopic appearance of the fluid was slightly opaque.

Dr. Keen remarked further, as to the anatomy of the thoracic duct, that Verneuil (*Le Système Veineux*, 1853) states that Boullard in twenty-four cases found it to empty by one mouth eighteen times, by two mouths three times, by three mouths twice, and finally once by six mouths, of which two opened into the subclavian, two into the jugular, and one each into the external jugular and the vertebral veins. Lacauchie (Henle, *loc. cit.*) gives an instance of four terminal canals. In twenty-one injections of the duct Boegehold found that in two cases it divided at its anastomosis with the veins into three or four branches, and in one case, about two inches before its termination, a branch as large as a straw passed to the subclavian, the main trunk emptying at the angle between the subclavian and the jugular. It is, therefore, possible in all these cases of wound that not the main trunk, but one of these branches—perhaps, as in Boegehold's case, a branch as large as a straw—was injured. Bayford (Boegehold, p. 447) records one case of dislocation of the thoracic duct from a curvature of the spine, which might increase materially the possibility of its being wounded should an operation have to be done in such a case. Boegehold (p. 455) also quotes a case from Scherb of the partial obstruction of the duct by a calculus. The occasional great height of the final curve of the duct in the neck has already been mentioned.

Secondly, as to the character of the fluid. There could be no possibility that the source of the fluid was other than the thoracic duct in Boegehold's and Phelps's cases, as from its milky color, the fluid was evidently chyle. In the other two cases the fluid has been so clear that it resembled serum. The quantity of the fluid in Phelps's case was very extraordinary, and leaves no doubt that it could only have been from the thoracic duct. In Cheever's case and his own the quantity and character of the fluid made it reasonably certain that it was from the duct, but it was not so demonstrably sure as in the other two cases.

Third, as to treatment. In Boegehold's case packing was sufficient to arrest the flow and the patient recovered. In Phelps's case pressure-forceps arrested it entirely. In his own case the suture of the vessel was perfectly feasible, and the result was most satisfactory. It seemed to him clear that if this procedure can be adopted it should always be done.

Dr. Keen also referred to the experimental researches of Boegehold, who concluded that the complete integrity of the duct for the support of life was not absolutely necessary, giving a number of instances of complete obliteration or compression of the duct without any symptoms. The collateral circulation of the lymph seemed to be established, and Schmidt and Mulheim have shown experimentally that the closure of the duct in dogs, in whom the canal is always single, did not affect either the digestion or the absorption of albuminous matter. An injury followed by closure of the duct, therefore, is not necessarily fatal. The danger is that if the duct is not closed, either compression of the lungs and heart from the constantly augmenting accumulation of chyle in the pleural cavity will prove fatal, or that the loss of nourishment will be lethal if it escapes externally. Wounds of the duct seem to be entirely capable of healing. Should the heart and lungs be compressed, clearly the pleural cavity should be opened in order to avoid the immediate danger of death from compression.

TRANSACTIONS OF THE SURGICAL SECTION
OF THE COLLEGE OF PHYSICIANS
OF PHILADELPHIA.

Meeting of April 13, 1894.

DR. JOHN B. ROBERTS in the Chair.

RADICAL OPERATION FOR CONGENITAL HYDROCELE
IN AN ADULT.

DR. THOMAS S. K. MORTON presented a man, aged twenty years, upon whom he had operated six weeks previously for congenital hydrocele of the tunica vaginalis testis. Incision and ligature of the neck of the sac, with subsequent packing with iodoform gauze, was the method of treatment adopted.

The packing was renewed every two days. He arose in five days, and in ten days returned to work, wearing simply a pad of bichloride cotton held in place by a suspensory bandage. The wound finally closed, under stimulation by twenty grains nitrate of silver solution, within three weeks. The result was perfect.

PICKAXE WOUND OF BRAIN.

DR. JOHN B. ROBERTS presented a patient who had recovered from a pickaxe wound of the brain.

Within an hour and a half of the injury, Dr. Roberts laid open the skull, and found pieces of bones driven into the brain. With mallet and chisel the edge of the fracture was cut away, and with forceps the fragments of bone were removed from the brain-tissue. After irrigation with a stream of bichloride solution, a small piece of gauze was stuffed into the wound to make a little pressure, and the scalp wound was closed except at the centre. The patient had union by first intention where the edges were sewed together, and second intention where the wound had been kept open by the gauze, which was removed at the end of twenty-four hours. No unfavorable sequelæ.

PERINEAL TESTICLE RESTORED TO ITS PROPER POSITION.

DR. EDWARD MARTIN presented a case of perineal testicle, the patient being a boy aged nine years. He had the testicle normally descended on the left side, but on the right side it had gone into the perineum, lying an inch in front of the anus. It was freely movable and normal in size. From its false position the gland was exposed to traumatism. The boy had already suffered from one attack of acute orchitis.

The testicle was cut down upon. The cord was dissected free, some dense fibrous bands passing backward towards the anus, and, being adherent to the epididymis, were cut, an opening was made in the tissue of the scrotum, and the testicle was secured in its proper position by two stitches passing through the lower part of the vaginal tunic and the inner skin surface of the base of the scrotum. The long wound was united in a cross direction, thus deepening the scrotal sac. The wound healed without suppuration, and the testicle lies in a perfectly normal position.

The boy is now perfectly well, and able to ride a bicycle without discomfort.

NON-RECURRENCE OF MALIGNANT MAMMARY DISEASE AFTER EIGHTEEN YEARS.

DR. THOMAS G. MORTON presented a patient, fifty-six years of age, on whom, eighteen years before, he had removed the right breast for malignant disease. The tumor, a rapidly-growing one, was large, and with the usual characteristic symptoms. Since the operation the patient has had no return of the disease, and continues in excellent health.

THE MARRIAGE OF SYPHILITICS.

DR. WILLIAM G. PORTER read a paper in which he remarked that syphilis may be classified for our purpose into three varieties,—viz., the benignant, the moderate, and the malignant.

To cases of primary syphilis which have been followed by an exceedingly moderate amount of secondary symptoms, and then almost without treatment by perfect recovery and the absence of further manifestations, the name of benignant is applicable.

By moderate syphilis are meant those ordinary cases in which

the disease runs through its various stages without severe symptoms,—perfectly responsive to treatment, generally controlled by it, but which it may take many months or perhaps some years to cure.

By malignant syphilis are meant those cases which are severe from the start, in which the earliest secondary symptom may be a rupia with a profound cachexia, or immediately on the disappearance of the chancre, or even sometimes before it has disappeared, the nervous system of the patient may be profoundly affected.

All three forms are generally curable,—the first exhausting itself, the latter two requiring the treatment of the *skilful* physician to overcome them. But up to the present time no means has been discovered by which one can say absolutely to an individual patient, "You are cured; you will never have a return of this disease unless you contract it again." Because of this many writers on syphilis claim that, as one can never say absolutely that a patient is cured, one has no moral right to advise him to marry.

He propounded the question, Under what, if any, circumstances is one justified in informing a patient who has suffered from this disease that it will be safe for him to marry? and answers as follows: In the first place, marriage should be absolutely forbidden to any patient who presents any of the symptoms of syphilis,—primary, secondary, or tertiary.

In the second place, marriage should be absolutely forbidden to all syphilitic patients who have not been subjected to a most thorough, complete, and prolonged treatment.

And finally, in the third place, before sanctioning the marriage of a syphilitic, the requirement of a sufficient treatment having been fulfilled, the physician should be satisfied that he is in perfect health, and that he has had no symptoms, even suspicions, of syphilis for a period of at least two years.

DR. J. WILLIAM WHITE remarked that he agreed with the general conclusions of Dr. Porter. His custom was to advise syphilitic patients that they must wait four years before marrying. But if a man at the end of three years has a slight mucous patch he need not on that account make the time five years. For fifteen or eighteen years he had been seeing a great many of these cases, and had from the start followed this general rule, having adopted the rule of Fournier, who had said in effect that syphilis must have been benign; that a period of three or four years must have elapsed, and that the treatment must have been thorough and complete. As time has gone on

he had come to place more and more weight on the one element of time, the period that has elapsed after inoculation, and comparatively less upon the thoroughness of treatment and absence of symptoms. Many of his patients had married and had children, and he could not recall an instance where such marriage was entered into with his consent and approval where anything happened to cause him to regret his action. He did not know a single case where, after four years had elapsed before marriage, there was born a syphilitic child.

DR. ARTHUR VAN HARLINGEN said that his own experience included a couple of dozen cases, which he had followed from five to twenty years. His custom had always been to wait until the secondary symptoms occur, and treat continuously. He could remember no case in which he had authorized marriage after the second year where the disease has been transmitted. He was aware that this was a much shorter time than is allowed, but his own experience was that after the second year healthy children can be engendered.

DR. HENRY W. STELWAGON said that in the average case of syphilis, occurring in a subject of ordinarily good health, living a temperate life, and who has had intelligent treatment, the power to communicate and transmit the disease is probably, with the exception of a few instances, lost in the course of a few years; and even in the imperfectly-treated and neglected cases, judging by general experience, the disease would seem to wear itself out in from two to five years. If this were not the fact, the examples of hereditary transmission would certainly be much more numerous than observations show them actually to be. It is, however, the uncertain cases, or the exceptional cases, which give concern and make one hesitate. He believed that persons in good health, of good habits, in whom the disease had been of a mild or average type and had run a favorable course, with no tendency to active recrudescence, and whose treatment had extended over a period of two or three years, during the last year of which there had been no manifestations,—that such persons might if three years or more had elapsed since the date of the contraction of the disease marry without the slightest risk.

EDITORIAL ARTICLES.

LAUENSTEIN ON STRANGULATION OF THE TESTICLE FROM TORSION OF THE SPERMATIC CORD.¹

CONCERNING this accident, of which so little has been written, Lauenstein says that it was first described by Nicoladoni,² in 1885. By a torsion of 180° and more, so great a circulatory disturbance is created that changes in the tissue of the testicle are brought about which very closely resemble the hæmorrhagic infarctions of the intestine, caused by emboli in the arteria mesaraica.

The first of Nicoladoni's cases was that of a sixteen-year-old laborer, who had had no testicle in the right side of the scrotum. When twelve years of age he had suffered with a severe attack of pain for the first time in the right inguinal canal. At that time a tumor, the size of a bean, had protruded slightly from the external ring. After a few hours the tumor and the pain disappeared. Several such attacks occurred during the course of the next year. Finally, a tumor the size of a hickory-nut appeared, which was very tender on pressure. Three days later the patient came to Nicoladoni's clinic. Examination showed a tumor in the right inguinal canal. It was firm, unmovable and painful, and about the size of a walnut. Under the application of ice the pain diminished, but the tumor did not disappear. The patient did not care to go through another attack of "periorchitis," and operation was performed. The tunica vaginalis was exposed. It contained, besides a small amount of bloody serum, the testicle, which was flatly compressed, pear-shaped, and bluish-black in color. Its posterior surface was adherent to the tunica. The

¹ Sammlung klinische Vorträge, No. 92, 1894.

² Nicoladoni: Die Torsion des Samenstranges, eine eigenartige Komplikation des Kryptorchismus. Archiv für klinische Chirurgie, Bd. XXXI, II.

spermatic cord, which was two centimetres in length, was twisted from right to left 180° . This was removed, and the wound healed promptly. The cord, which was three-quarters of a centimetre thick, was made up of the vas deferens and vessels. The funiculus spermaticus was completely free, and was nowhere held by a peritoneal fold. Examination of the atrophic testicle showed no sign of a primary inflammation, but, on the other hand, there was a good deal of hæmorrhagic infiltration of the organ.

The second observation of Nicoladoni's was of a sixty-two-year-old laborer, who presented himself at the clinic with a swelling of the right side of the scrotum. The swelling had appeared a few days before, after hard work, and was accompanied with pain and vomiting. There was some redness, œdema, and fluctuation. The diagnosis of purulent periorchitis was made, and incision practised. The tunica vaginalis propria contained, instead of pus, 200 grammes of hæmorrhagic fluid, and a testicle which was enlarged, darkly discolored, and rotated more than 180° on its pedicle. This case also was cured by removal of the testicle. The testicle was flattened. The enlarged epididymis contained two large cystic cavities, and the whole organ was the seat of hæmorrhagic infiltration.

The conclusions at which Nicoladoni arrived were that the accident of torsion may occur both in the descended and undescended testicle.

Chauveau experimented on rams, and found that the testicle became atrophic after artificial twisting of the cord. Gangrene occurred only in those cases in which septic matter had been introduced into the vessels before the torsion was practised. Such an atrophy may occur after operation for varicocele. It is a fact of historic interest that the Montpellier surgeon, Delpech, was murdered, in 1832, by a patient on whom he had operated for a double varicocele, and who as a result of the operation suffered atrophy of both testes.

Cases have been reported now and then as "acute periorchitis," in which, instead of pus being discovered, the tunica vaginalis propria was found to contain only hæmorrhagic fluid, and an enlarged

and discolored testis. Volkmann¹ made such an observation as this in 1877. His was the case of a boy fifteen years of age, who, after hard labor, had been suddenly seized with vomiting and pain in the left side of the scrotum. Acute inflammation was suspected. An incision revealed a greatly-enlarged and discolored testicle, with marked dilatation of the spermatic vessels. In the course of time the testicle became gangrenous and was exfoliated. Volkmann did not discover the cause of the infarction.

These observations incited certain observers to make experiments with the vessels of the testicle. Miflet² has reported eighteen experiments upon dogs. Artificial emboli were caused in seven cases; the arteria spermatica interna was ligated in four cases; in five cases the artery and vein were both tied; and in four cases the vena spermatica interna alone was ligatured. In two of the first seven the arteria deferentialis was ligated. As a result of these experiments, the following deductions were made:

(1) The arteria spermatica interna bears to the testicle the relation of an end artery in the sense of Cohnheim.

(2) The checking of the blood-supply to the testicle through the internal spermatic artery by ligation or by embolism is quickly followed by the formation of hæmorrhagic infarction. These infarcta involve especially the superficial layers of the testicle.

(3) The glandular tissue of the testicle is especially sensitive to circulatory disturbances in the vessels of the spermatic cord, not only by simultaneous ligation of both the internal spermatic artery and the spermatic veins, but also by the slightest circulatory hinderance in veins alone. The glandular tissue immediately degenerates, and an atrophy of the organ results.

(4) The epididymis, which is supplied by the arteria deferentialis,

¹ R. Volkmann: Ein Fall von akutem hæmorrhagischen Infarct und Spontangangrän des Hodens. Berliner klinische Wochenschrift, 1877, No. 53.

² Joseph Miflet: Über die pathologischen Veränderungen des Hodens, welche durch Störungen der lokalen Blutcirculation veranlasst werden. Archiv f. klin. Chir., Bd. 24, XXIII.

is not at all or but slightly affected by obstructing the circulation of the internal spermatic artery.

(5) When the circulation in both the internal spermatic and the deferential arteries is shut off, the epididymis also undergoes complete degeneration.

Following these observations, a third case was reported from the clinic of Helferich, in Greifswald. The patient was a young man, who had at the ages of fourteen and nineteen respectively suffered an attack of pain in the right inguino-scrotal region, and who was admitted to the clinic in 1889, at the age of twenty-one, with the diagnosis of strangulated inguinal hernia. Four days before his admission he had been suddenly seized in the night with severe inguinal pain, and attributed the same to his jumping over a ditch on the day before. The painful inguinal swelling was treated with ice and laxatives. The right testicle was not in its normal place in the scrotum. At the inner two-thirds of Poupart's ligament was a tender, elastic tumor about the size of a pigeon's egg. In the upper part of this was a resisting body, which seemed to be the testicle. The patient's temperature was 37.8° C. Under treatment with ice, laxatives, and morphine, neither the pain nor the swelling abated. On the third day Helferich operated. A pipe-shaped cystic sac was exposed, which extended to a narrow pedicle in the direction of the internal inguinal ring. In this sac he found a blood-stained fluid and a swollen, dark-red testicle with its cord twisted to the left 360° . The testicle lay in the upper part of the sac with its upper pole directed downward. From its under surface the cord passed from above and without downward and inward to the inguinal canal. The testicle and cord were free in the sac. The cord was ligated and the testicle removed. Microscopic examination of the testicle showed it to be the seat of hæmorrhagic infarction throughout. The outer layer showed a beginning necrosis.

The fourth case in the literature came from the clinic of Mikulicz,¹ in Königsberg, in 1890. A four-year-old boy was admitted

¹ Hans Gervais: Ein Fall von Torsion des Samenstranges. Inaug. Dissert., Breslau, 1891.

who had fallen six days before a distance of twelve feet. He was unconscious after the fall, and had sustained a trivial scalp wound. Two days after the fall he began to complain of pain in the lower left part of the body. On the third day swelling and redness of the scrotum developed, which continued till he was admitted to the clinic. There also was some swelling along the line of the left spermatic cord. In the right side of the scrotum an apparently normal testicle could be felt; in the left side was a tense, tender tumor, adherent to the skin. The swelling extending up into the inguinal canal seemed due to an enlargement of the cord. In the diagnosis of this case traumatic inflammation was out of the question, because there was no sign of local injury. There was too little fluctuation for hæmatocele or hydrocele. The excellent condition of the child's general health excluded constitutional disease. Mikulicz diagnosed torsion of the pedicle of a lately-descended testicle. He opened the tunica vaginalis propria, which was found to contain a yellowish fluid and the testicle, which was about the size of a hazel-nut and of a dark purple color. On the head and body of the epididymis were distended veins. The tail of the epididymis and the beginning portion of the cord were twisted 360° . The organ was easily untwisted. The color improved somewhat, and no resection was performed. Convalescence was complicated by an attack of measles. A portion of the testicle became necrotic and was exfoliated.

The fifth observation was made by Whipple,¹ in 1891. A young man, sixteen years of age, was admitted to the hospital with the following history: Seven years before he had noticed a lump in the left groin which disappeared into the abdomen. On the day before his admission to the hospital he had fallen over and felt something give way in the left groin. Next day vomiting developed, and the bowels moved after two days of constipation. An hour-glass-shaped tumor could be felt in the groin. The lower part of the tumor contained the testicle, which occupied the upper part of the scrotum. The

¹ Whipple: Strangulated epididymis of incompletely-descended testis, producing symptoms like those of strangulated hernia; castration; cure. *Lancet*, May 16, 1891.

upper part of the tumor, which lay over the outer inguinal ring, was the size of a hen's egg, very tense, tympanitic, and gave no impulse on coughing. In the upper part of the tumor, besides bloody fluid, was the enlarged, dark-red, strangulated epididymis. The true testicle lay in the lower part of the tumor. To it was adherent a string of omentum. The epididymis was twice twisted on its axis. The further operative procedure consisted in removing the testicle with the string of omentum. The stump of the cord and omentum were shoved back into the abdomen, the sack tied off, and the outer ring and the superficial wound closed.

The sixth case was reported from Czerny's clinic, in Heidelberg.¹ A youth, eighteen years of age, had been seized on sneezing with a severe pain in the right testicle, which was situated just without the outer inguinal ring. He immediately developed local tenderness, vomiting, pallor, feeble pulse, profound prostration,—in short, symptoms of strangulated inguinal hernia. Later developed swelling, and the testicle was separated from the outer ring by a furrow. A diagnosis of compressed varicocele was made, and the testicle and cord were exposed by a longitudinal incision. The tunica vaginalis propria was found to contain blood-clots, and the testicle had the appearance of a gangrenous intestine. It was twisted from right to left one and a half turns. It was not removed because of the atrophic testicle on the other side. Four months later the patient again presented himself at the clinic. The right testicle lay at the root of the penis. It was quite fixed, of firm consistence, and three centimetres long by 2.5 centimetres thick. The left testicle was larger than normal and in normal position. Czerny did not believe that the organ had been restored to function by the operation, but expected that it would become atrophied.

The seventh case was reported by Thomas Bryant.² He saw, in

¹ Edward von Meyer: Ein Fall von Torsion des Samenstranges mit Erhaltung des Zurückgedrehten Hodens. (Aus der chir. Klin. zu Heidelberg.) Deutsche medicinische Wochenschrift, 1891, No. 25.

² Thomas Bryant: Torsion of the spermatic cord with strangulation of the testicle. British Medical Journal, February 27, 1892.

1889, an incompletely-descended testicle of the left side in a young man fifteen years of age. The case at first resembled strangulated hernia, and was at once subjected to operation. The testicle was almost black, and the spermatic cord was found twisted upon its axis one and a quarter times. It was easily untwisted, and, as it remained warm, the operator decided to leave it. A rapid atrophy was the result.

An eighth case was reported by Herbert Page,¹ and was that of a seventeen-year-old youth who had been admitted to the hospital with symptoms of strangulated inguinal hernia of the right side. He had been seized during the night with severe pain in the testicle and vomiting. At the same time the bowels became constipated, the tumor became larger, tender, red, and œdematous. The possibility of orchitis was suspected. On the fourth day operation was performed. The testicle was black and gangrenous, the epididymis was much swollen, and the spermatic cord was twisted from left to right two turns. It was easily untwisted. The torsion was just at the external ring. No cause for the accident could be ascribed. The cord was ligated and the gland removed. Page has laid especial stress upon the difficulty of diagnosis because of the great resemblance of the case to strangulated hernia. He believes with Bryant that many cases of atrophy of the testicle are due to torsion of the pedicle. He observes that in such cases all of the signs of inflammation are present,—tumor, calor, rubor, dolor,—yet no pus is found.

The ninth case in the literature was reported by Anders.² The patient was a thirteen-year-old boy whom he saw for incarcerated hernia, and found a tense tumor of the left groin and cryptorchism of the left side. An incision exposed a tumor the shape of a fish's bladder. The sac contained a clear fluid and a bluish-red tumor, which protruded partially through the external ring and was tightly grasped by the same. After splitting the ring it was discovered that the tumor was a gangrenous epididymis, which spontaneously twisted one

¹ H. Page (St. Mary's Hospital): Twisted spermatic cord and gangrene of testis. *Lancet*, July 30, 1892.

² E. Anders: Kastration eines durch Torsion nekrotischen Leistenhodens. *St. Petersburger medicinische Wochenschrift*, 1892, No. 47.

and a half turns. The testicle and a portion of the tunica vaginalis were extirpated. This patient had worn a truss for five years for the supposed hernia. An interesting feature of this case is the isolated twisting of the epididymis and the fact that it untwisted spontaneously as soon as the ring was cut. Nothing was said about the direction of the torsion. Lauenstein supposes that the truss had something to do with the torsion or with the strangulation by the external ring.

A tenth case is that reported by A. E. Barker.¹ The patient was fifteen years of age. His right testicle was small and not completely descended, and since his seventh year he had had a hernia of the same side. After a stool he was unable to return the hernia. During the two following days vomiting occurred. On the third day he had to go to bed, where he remained till he was removed to the hospital eight days after the accident. He presented the symptoms of local swelling and pain. The tongue was dry, pulse 96, temperature 102.2° F. The right testicle was two inches below the external ring, about which was considerable swelling. Above this was an oval swelling representing the canal. The overlying skin was dark and œdematous. The abdomen was not tender. During the seven days there had been no movement of the bowels. A diagnosis of omental hernia was made. At the operation, from the supposed hernial sac escaped some bloody serum and clots; and the flat, tense and dark, livid testicle was found twisted one and a half turns upon its pedicle from without inward. There was no hernia. The twist was removed and the gland excised. After the operation the temperature fell to normal.

To these Lauenstein adds a case of his own. The patient was a twenty-five-year-old laborer, who, while busy at work, was suddenly seized with a severe pain in the right inguinal region which made him unfit for further work. While being carried home he vomited once. During the following night he vomited three times. On the second day he was removed to the hospital. The history was elicited

¹ A. E. Barker (University College Hospital): A case of torsion of the spermatic cord with strangulation of the testicle. *Lancet*, April 8, 1893.

that he had but one testicle and that on the left side. He had never before had such an attack. Above and along the right ligament of Poupart was a tense, elastic tumor the size of a hen's egg. It was painful and tender, and gave, on percussion, a short, tympanitic note. The abdomen gave no symptom. No testicle occupied the right scrotum; while the left was normal. The cremasteric reflex was normal on the left side, but was entirely absent on the right. The tongue was coated, otherwise the constitutional signs were normal. Temperature 38° C. The diagnosis of torsion of the right testicle was made, though strangulated omentocoele and appendicular abscess were considered. The patient's bowels had moved, so that strangulated enterocoele was not taken into account, though a Littre's hernia was thought of. There was, in Lauenstein's opinion, no urgent indication for operation, so the patient was treated with opium suppositories, ice applications, and fluid diet. After this treatment was instituted the patient vomited but once, the tumor gradually became smaller. The pain, tenderness, prostration, and insomnia did not improve, so on the fifth day after the onset of the attack, an operation was performed.

An incision was carried parallel with Poupart's ligament. A sac was opened from which escaped some darkly-stained serum. In this sac was discovered the dark-blue testicle. The cyst reached from the spine of the pubes to about two fingers'-breadths above the level of the anterior superior iliac spine. It lay within the sheaths of the abdominal wall and was covered with serous membrane. This cavity was divided into two parts, of which the outer was considerably larger than the median. In the latter was the darkly discolored testicle with the epididymis directed upward. Directly at the insertion of the spermatic cord was a torsion of 180° from left to right. The outer compartment of the sac contained clear serum.

On untwisting the cord the gland did not improve in color; it was, therefore, removed. The testicle, from the head to tail of the epididymis, measured six and a half centimetres long, four and a half centimetres high, and two and a half centimetres thick. The cut surface of the gland looked like a blood-clot. Microscopic examina-

tion showed that the whole structure was filled with blood,—the connective-tissue spaces and seminiferous tubules.

The fact that these cases varied between the ages of four and sixty-two years of age would indicate that the age has little to do with this disease. Six cases involved the right side. All of these testicles must have been abnormally movable. There was a history of previous attack of strangulation of the testicle in two cases. In five cases there was a distinct exciting cause. A jump over a ditch on the previous day, a fall of twelve feet three days before, sneezing, and hard manual labor, were the causes assigned. In all of the cases the attack came on suddenly, and the pain was invariably severe. The torsion of the cord presented the same picture in all cases. The testicle was shiny, darkly discolored, more or less swollen, and surrounded by yellow or bloody fluid. The testicle spontaneously untwisted as soon as it was relieved from constricting influence. The hæmorrhagic infarction was in all cases unquestionably due to the twisting of the pedicle.

Kocher¹ is of the opinion that the separation of the funiculus into two segments has much to do with causing this accident. In the Mikulicz-Gervais case it is stated that the tail of the epididymis had become twisted about the beginning portion of the vas deferens. Lauenstein is of the opinion that the shortness of the cord may have something to do with the accident. In Nicoladoni's first case the cord, which was twisted 180° , measured but two centimetres long. In the cases of Whipple and Anders there was an isolated torsion of the epididymes, which can probably be regarded as being due to congenital misformation. The flat form of the testicle may also have something to do with the occurrence, or rather with the maintenance of the deformity.

The direction of the torsion is noted in six of the above cases. Five of these show a left spiral twist. Four of the cases involved undescended testes of the right groin, and one a testicle just outside of the outer ring.

¹ Kocher: Die Krankheiten der männlichen Geschlechts-organe. Stuttgart, Ferd. Enke, 1887.

The cause of the accident is attributed to mechanical movements of the organ by walking, jumping, etc.

Of chief importance is the diagnosis. In all of the reported cases the symptoms simulated some inflammatory process. The onset was very sudden, and followed by pain, local swelling, oedema, redness, and fever. The sudden onset was usually followed by reflex disturbance, especially vomiting.

Lauenstein draws the following conclusions from these observations:

(1) Up to date at least eleven cases of the disease designated by Nicoladoni as torsion of the spermatic cord have been reported. A number of such cases have probably been reported as "strangulation of the testicle" and "acute periorchitis."

(2) The explanation of the occurrence of hæmorrhagic infarction of the testicle due to torsion of the pedicle was first made by Miflet under the direction of Volkmann.

(3) The predisposing cause of the accident is the freedom of the testicle as it hangs like a fruit from its stem. This torsion may occur not only in the inguinal testicle, but also in the case of the testicle the descent of which into the scrotum has been delayed.

(4) The conditions which favor the accident are flat form of the testicle, the *inversio testis horizontalis* (Kocher), division of the cord into two sections, broad arrangement of the parts of the cord, or abnormal shortness of the cord.

(5) It is a question whether the exciting cause lies in the ordinary movements of the body or is to be assigned to some sudden and abrupt jarring.

(6) The fact that in five cases of right-sided inguinal testicle a left spiral twisting of the cord took place is similar to the observation of Küstner, that right-sided ovarian tumors tend to undergo a left spiral torsion of the pedicle, and ovarian tumors of the left side tend to undergo a right spiral torsion.

(7) The diagnosis of torsion of the testicle on account of the suddenness of the attack, and the possible co-existence of hernia of

the intestine or omentum may be confused with that of the latter condition. Abscess of the appendix vermiformis is also to be borne in mind.

(8) The strangulated inguinal testicle must be removed. The scrotal testicle may be left if the circulation is not too greatly disturbed.

(9) Because of the fact that this disease is not common, and is, moreover, rather difficult of diagnosis, when cases of this sort are met they should be studied with especial care, with the view of throwing more light upon this subject.

Lauenstein made a correct diagnosis in the case which he has reported, yet he states further on that there seemed to be no urgent indication for operation, so he treated the patient with opium and ice, and did not operate till the end of five days. There seems to be some inconsistency here, for he was certainly aware of the harm which procrastination was doing.

To the above table of cases should be added the Davies-Colley¹ case.

In the *ANNALS OF SURGERY*, May, 1894, is a paper by Johnson, in which the meagreness of the literature upon this subject is commented upon, and in which is appended an abstract of the history of an additional case.

JAMES P. WARBASSE.

FISCHER ON SUPPURATIVE INFLAMMATIONS IN THE SUBUMBILICAL SPACE.²

THE author begins by calling attention to the fact that the periumbilical region, so interesting from a surgical stand-point, may be subdivided into the supraumbilical region, following the course of the

¹ British Medical Journal, April 6, 1892; the cases of Langton (St. Bartholomew's Hospital Reports, Vol. XVII, p. 88), Nash (British Medical Journal, April 3, 1893), Cohen (Deutsche Zeitschrift für Chirurgie, 1890, p. 101), Owen (Lancet, November 18, 1893, p. 1247), and Johnson (*ANNALS OF SURGERY*, March, 1893).

² H. Fischer (Berlin): Die Eiterungen im subumbilicalen Raume. Sammlung klinischer Vorträge, No. 89.

vena umbilicalis or of the ligamentum suspensorium hepatis and the subumbilical region, which extends along the arteria umbilicalis and the space adjoining the urachus. These two areas are entirely separate, and yet, for causes which will be mentioned later, inflammation in one may easily involve the other.

The anatomy and pathology of the subumbilical space was first made the subject of investigation by Jouon in 1877. By him it was described as a triangle, having as its base a line drawn transversely through the navel, ending laterally at the outer edges of the rectus abdominis muscles, and its apex at a point about ten centimetres below the navel. The right and left parts of this space were described as equal in size, and so separate that each must be filled separately in order to demonstrate the cavity. This paper of Jouon's attracted but little attention, and almost no discussion. Charpy, however, in 1888, made a careful study of the ventral abdominal wall, and came to the conclusion that the subumbilical space was partly preperitoneal and partly prefascial.

The recent investigations of H. Fischer have given much more precise knowledge of the subumbilical space. His method of demonstration was as follows: An incision was made at the lateral edge of the rectus muscle, the point of a syringe was inserted between the sheath of the rectus and the peritoneum, and through this colored gelatin was slowly injected. As a result of this procedure, a tumor, shaped like the ace of spades, was produced, with its base at the navel and its apex 6 centimetres below the navel in the middle line. The lateral portions were most protuberant. Towards the mid-abdominal line the tumor decreased in prominence, and along the linea alba there was a deep groove. The measurements of the tumor were as follows: greatest breadth at the base, 14.6 centimetres; least breadth at the apex, 1.6 centimetres; greatest length, 9 centimetres. The space was present and approximately of the same size and shape in young and old, male and female, fat or thin persons. The navel itself and the firm adhesions which exist between the peritoneum and the sheath of the rectus shut off its cephalic border, and similar

adhesions circumscribed its lateral limits. Jouon did not demonstrate a well-marked lower border, and thought that communication with the *cavum Retzii* existed unless closed by inflammatory adhesions. To this Fischer does not agree, as the gelatin injections in no case penetrated the space of Retzius. The space thus filled with gelatin was found to lie between the peritoneum and the fascia transversa Cooperi. This fascia is the thin fibrous layer overlying the inner surface of the *musculus transversa* and continued upon the diaphragm; above the navel its structure is so delicate as scarcely to merit the name of fascia, is markedly thickened below the navel, especially in the neighborhood of Poupart's ligament. The parietal layer of the peritoneum is firmly united to the fascia transversa along the *linea alba* and immediately around the navel, while on the sides of the abdomen the two are easily separated. On the inner surface of the navel the fascia transversalis is entirely absent. A cord-like mass of connective tissue accompanies the *urachus* and the umbilical artery. This has been named fascia subumbilicalis (Velpeau), or fascia infraumbilicalis (Heurtaux). It extends from the summit of the bladder to the navel, and its greatest development is reached in the neighborhood of the *ligamentum suspensorium vesicæ*. It diminishes markedly in size towards the navel.

The investigations of W. Herzog, as to the origin and limits of the subumbilical space, show that at the sixteenth week of foetal life the umbilical artery is surrounded by an unusually well-developed adventitia, which surrounds the artery with a thick mantle of loose embryonal connective tissue. This mantle accompanies the artery deep into the abdominal cavity, beneath the bladder, and is doubtless a continuation of the tissues forming the umbilical cord. As foetal development advances, this structure becomes changed to true connective tissue. During the first months after birth a cross section through the lower segment of the navel shows the entire space between the *recti* muscles filled with a mass of connective tissue, connected with the navel above, and at the sides continuous with the sheath of the *rectus*. A mesal section through this region in older children

demonstrates the presence of a broad band of connective tissue extending from below towards the umbilicus and connected with the skin throughout its entire length by a series of radiating fibres.

Luschka has demonstrated that the urachus retains its tubular structure in the portion nearest the bladder, and at intervals along its caudal half. The lumen of its cephalic half, however, ultimately becomes obliterated. He was able to show also that the bladder musculature is continued along the vesico-umbilical ligament for a short distance only, and that from this point on connective tissue with elastic fibres surrounds the urachus like a sheath. A small valve-like opening on the inner surface of the bladder can usually be found through which a sound can be passed into the urachus for a longer or a shorter distance. The course of the urachus is somewhat tortuous, and here and there along its course are lateral dilatations which in some cases become cystic. The urachus may remain patent along its entire length. In fourteen such cases; which have been reported, twelve were males, for the male urethra, owing to its greater length and curved course, offers greater resistance to the escape of urine; the urachus in the male is, therefore, more apt to have urine forced into it. Finally, the investigations of Luschka show that a thin cord of connective tissue extends from the urachus to the ligamentum teres, thus forming a bridge connecting the supra- and subumbilical spaces, and furnishing a means for the extension of inflammatory processes.

Acute inflammations which occur in the subumbilical space have either an acute or a chronic course. They may originate in this locality or may occur from extension of the inflammatory process from some neighboring locality.

(1) *Acute Abscess of the Subumbilical Space.*—Acute abscesses of the abdominal wall have been described by many early writers, but, as a rule, so vaguely that the origin of the trouble has been a matter of doubt. In 1877, Heurtaux reported six cases of subumbilical abscess; of these, but one occurred in a previously healthy individual, the others developed after attacks of pleurisy, typhoid, measles complicated by pneumonia, and one during the puerperium.

The acute cases began with pain, fever, and constipation, rarely with vomiting. In subacute cases the general symptoms were very slight. The tumor that developed was immovable and triangular in shape; the base at the navel, the apex about midway between the navel and the symphysis. It contained a moderate amount of pus (120 to 150 grammes), and in four cases discharged its contents spontaneously,—twice through the navel, once in the middle of the hypogastric region, and once into the vagina; twice the abscess was incised. The abscess cavity in all of these was flattened antero-posteriorly. The subject has received little attention in France and still less in Germany.

The author reports five well-marked cases, similar to those of Heurtaux, and in each case the symptoms were quite characteristic. The patients were males, between seventeen and thirty-four years old; several had suffered from gonorrhœa, but with this exception all had previously been quite well. In no case could a history of injury be elicited. A marked chill ushered in the attack in each case, and the temperature varied from 38.5° C. (101° F.) and 39.5° C. (103° F.) throughout the disease. Change in position, sitting up in bed, or pressure upon the abdomen caused severe pain, radiating from the navel over the entire abdomen. The patients lay upon the back, the legs were drawn up, the abdomen was tense, the breathing of a purely costal type. Vomiting was frequent; the vomitus was at first slimy, and later stained with bile; food or drink increased the vomiting; it was preceded by nausea, and was followed by faintness; it was copious, and not in mere mouthfuls as is the case in peritonitis. The patients were pale and in a state of partial collapse; the extremities, however, remained warm. The pulse was frequent and small. Much thirst and anxiety disturbed the sufferers. These symptoms were often so pronounced that in many cases the attending physician feared the presence of a general peritonitis, and gave a very grave prognosis. Since abdominal pressure was so very painful to the patient, neither gas nor fæces were passed, and this rendered the diagnosis of ileus not infrequent. In Fischer's cases no bladder symptoms occurred,

but Bouilly reports retention of urine in a similar case. The skin over the abdomen showed no redness at first, but in the course of three days a slight color showed below the navel. Palpation was unsatisfactory, owing to abdominal tension, and extreme pain on pressure.

These alarming symptoms continued for from two to four days, and then vomiting and collapse ceased, the bowels began to move, and the pain became localized about the umbilicus. Here, too, appeared slight redness on pressure, and a marked œdema. Careful palpation sometimes showed a firm area of infiltration, triangular in shape, and limited by the lateral recti boundaries. The skin was movable over this area, but was not raised in folds. Examined under an anæsthetic the recti were movable over the tumor. Percussion showed dulness over the entire region. By grasping the infiltrated area by the hand it could be lifted up with the abdominal wall. In the course of from nine to twelve days an elliptical tumor of the size and shape of the bladder developed immediately below the navel. Not infrequently a well-marked groove corresponding to the linea alba could be observed. The tumor in some cases became raised five or six centimetres above the level of the abdomen; its prominence decreased with the degree of abdominal pressure. Fluctuation became more and more evident.

Spontaneous rupture has been observed (*vide supra*), but Fischer's cases were operated upon early in the second week. In these latter cases (Fischer's) a quantity of thick yellow pus was evacuated, containing no gas, and without a fæcal odor. No actinomyces were found in the pus, but in two cases many large pavement epithelial cells were found; these were granular, and showed a distinct nucleus, usually kidney-shaped, but occasionally completely divided. The peritoneal cavity seems in all cases to have been protected by the thickened abscess-wall. The septum formed by the linea alba and its firm union with the peritoneum was usually either so pervious that even if the inflammation was one-sided at the beginning both halves of the subumbilical space were involved, or else the median septum was deflected by the pressure.

Diagnosis.—The correct diagnosis of existing conditions is somewhat difficult. Besides the symptoms of general peritonitis already mentioned, and the other symptoms that point to ileus, the possibility of appendicitis must always be considered and excluded. Ulceration of the stomach or of the intestines must also be taken into account in making a differential diagnosis.

* A satisfactory explanation of the grave symptoms that mark the onset of the disease is difficult to find. They cannot be due to the pressure exerted by the transudate upon the peritoneum or to a diminution of the peritoneal cavity, for these conditions exist only at the beginning of the attack when the pressure is least. A circumscribed peritonitis might be held to be the cause of the initial symptoms were it not for the fact that this remains circumscribed and shortly disappears, and that, moreover, subperitoneal abscesses occur at other places without producing symptoms of peritonitis. It seems probable that the slow stretching and final rupture of the numerous connective-tissue fibres which unite the inner sheath of the recti muscles to the inscriptions tendineæ is the source of the vomiting and severe pain manifest at the beginning of the attack. Experiments show that a slow and repeated stretching of these tissues produced by the insertion of a foreign body or by the injection of a fluid cause much more severe local and general symptoms than a sudden laceration due to a very large injection. In the formation of the abscess the painful distention and tearing of the tissues diminishes and the peritoneal symptoms cease.

Prognosis.—The prognosis in all cases so far observed is favorable. However severe and threatening the initial symptoms are, the subsequent course of the disease with skilful surgical treatment is mild and free from danger. After the opening and curetting of the abscess cavity, and the use of iodoform-gauze tampons, the cure is rapid, and is usually complete at the end of two or three weeks. The abscess cavity closes readily, and is unattended with the formation of fistulæ or of induration.

Treatment.—The treatment of the disease is expectant and symp-

tomatic during the development of the abscess, but once the diagnosis of pus is clearly established the abscess cavity is to be opened and emptied of its contents. A careful use of the curette is usually advisable. The abscess cavity is then to be packed with iodoform gauze, and the routine treatment of similar cavities is to be carried out.

(2) *Chronic Abscess in the Subumbilical Space.*—A chronic abscess in this locality is even more of a rarity than is the acute form; the anatomical and clinical relations of the chronic process are, moreover, far from being clear. In the majority of the cases that have been reported, the abscess has been of tubercular origin; and the pus which finally escaped, after a long period of development, was pale in color, and contained numerous flocculi of cheesy material, such as are found in most tubercular inflammations. In a few cases actinomycosis abdominalis was the causative factor; the course of the disease is very slow, and is usually unattended with fever; in the pus which finally forms are to be seen the characteristic masses of the micro-organisms; these, of course, are rendered still more clear by appropriate staining and microscopic examination.

In these chronic cases the course of the disease is a long one, and after the abscess cavity has been emptied, fistulæ are prone to remain for some time; these are especially common at the umbilicus itself.

(3) *Rupture of Abscesses of Various Origin into the Subperitoneal Space.*—As the subperitoneal space is quite separate from the neighboring cavities, its involvement in purulent inflammations arising in other localities is not common. That it can be thus involved, however, is a fact to be borne in mind. Some of the cases in which this condition has occurred are of interest. An abscess of the liver, following the course of the ligamentum suspensorium hepatis to the navel, and thence along the connective-tissue bridge above described, has involved the space under discussion; when finally operated upon, five gall-stones the size of pigeon's eggs were found in the cavity, midway between the navel and the symphysis pubis. In another patient

a long-neglected empyema burrowed its way beneath the ventral insertion of the diaphragm, and finally caused the subumbilical space to be the site of a considerable accumulation of pus. An appendical abscess was the cause of this secondary involvement in a third case which has been reported.

Various complications may result in such cases. The treatment is, of course, directed towards the cure of the primary condition.

(4) *Tumors of the Subumbilical Space that have undergone Purulent Degeneration.*—These, too, are very rare. In one case an echinococcus cyst of the ventral abdominal wall was the condition found upon operation: this had broken down, and when the abscess wall was opened masses of pus were found, mingled with the parasitic growth. Until quite recently no case of dermoid cyst in this particular locality had been reported. Such a condition has recently occurred, and a mass of pus, cheesy material, and considerable hair was removed from the tumor mass. As epithelial cells are a normal constituent of the cavity-wall cancer can develop. Such a neoplasm was operated upon by Fischer, and a mass of pus allowed to escape. The patient who had suffered from the disease for many months, died fourteen days after the operation from inanition. The autopsy revealed a carcinoma composed of masses of large epithelial cells, such as were found in the normal subumbilical space. The tumor had broken down in many places, and contained much pus. Strangely enough, although the growth extended to the bladder, and was firmly adherent to that organ, the mucous membrane of the bladder showed no pathological changes.

Besides these primary carcinomata there are numerous ways in which secondary neoplastic deposits may occur in the subumbilical space, and by degenerative changes may discharge pus upon operation. The prognosis in such cases is well-nigh hopeless.

H. P. DE FOREST.

REVIEWS OF BOOKS.

LEHRBUCH DER SPECIELLEN CHIRURGIE FÜR AERZTE UND STUDIRENDE.

Von DR. FRANZ KOENIG, Ord. Professor der Chirurgie, Geh. Med. Rath, Director der Chirurgischen Klinik in Göttingen. Sechste Auflage, II. Band, mit 121 Holzschnitten. Berlin, 1893: Verlag von August Hirschwald. III. Band, mit 104 Holzschnitten: Berlin, 1894. (Text-book of Special Surgery for Physicians and Students. By DR. FRANZ KOENIG.)

The general comments which we have made concerning the first volume of this splendid work apply also to these two volumes which have followed it. Notwithstanding the increasing number of surgical text-books, this work, now in its sixth revised edition, continues to hold its place. The reasons for this are, its completeness in detail, the fact that its revisions bring it thoroughly up to date, the clear judgment and truthfulness of its author, and the large amount of scientifically interpreted clinical experience which has been brought to bear in its compilation.

The second volume is devoted to the diseases of the thorax, abdomen, urinary organs, and the male generative organs.

Appendicitis is described in the chapter on "Perityphlitis." The author seems to be kept well posted on our American surgeon, Senn, for the name of this gentlemen is repeatedly met. "Usually," says Koenig, "there is an inflammation of the vermiform appendix; Senn and a number of American physicians have designated this as appendicitis." He also states that "a number of American physicians (Senn, Treves, Penrose, Baldy, and others) have effected cures of the disease by removing the appendix." He still holds that inspissated fecal matter, foreign bodies such as seeds, etc., are responsible for perforative ulceration.

The chapter on abdominal tumors is very practical ; and especially worthy of note is the section on echinococcus cysts. The author tells of a case of sarcoma of the ileo-cæcal valve which had become invaginated into the transverse colon. He opened the colon at that point by a longitudinal incision, resected the portion of gut bearing the growth, reduced the intussusception, and then closed the colotomy wound, although without securing the ultimate recovery of the patient.

He mentions a case upon which he made an autopsy, which had been supposed to be one of internal incarceration. He found that the obstruction had been caused by a thin membranous stricture in the rectum, which could easily be broken by the finger introduced per anum.

The chapter on hernia is a finished essay. Of the treatment of this malady he says, "When day by day new methods against a disease are conjured up, when almost every surgeon treats it differently or by some method of his own, the conclusion is justified that none of the methods is an ideal one and that none accomplishes the desired end."

Koenig is of the opinion that the mortality in strangulated umbilical hernia is even greater than 46.7 per cent., as figured by Uhde ; but that these cases urgently call for operation. He accuses Lucas-Championnière of making incorrect statistics by counting all cases as cured which did not return to him for after-treatment. Kocher's method of radical cure is not given.

Senn's plate anastomosis is fully described ; but the author does not think that it will supplant the German method of suture.

He regards the cautery as the most certain and least dangerous treatment for hæmorrhoids.

The broad learning and extensive experience of the author is evidenced in the chapters on tuberculosis of the genito-urinary tract. The positive diagnosis of tuberculosis of the bladder, he asserts, rests upon two conditions,—the discovery of the tubercle bacillus and the clinical experiment. The first condition so often fails that he

has adopted the second for positive diagnosis. This consists in the injection of some of the urine into the eye, the joint, the pleural or abdominal cavity of a rabbit. He employed this method before the discovery of the tubercle bacillus, and even yet he resorts to it as the surest and easiest diagnostic help in those cases in which the identification of the germ has not been satisfactorily made.

The third volume is devoted to the diseases of the spinal column and the extremities. The subject of orthopædic surgery is thoroughly dealt with. Hoffa and Lorenz are frequently referred to, and many of the cuts are similar to those in Hoffa's work.

The "gehverband" recently invented by Bruns for the ambulant treatment of fractures of the femur is described though not endorsed.

It is pleasing to note that the author at last feels enough confidence in his Göttingen asepsis to practise suture of the patella. He has been among the last to come over to this surgical procedure.

These two volumes are considerably larger than those of the fifth edition. Much has been added, and some of the chapters have been entirely rewritten. The chapters in Vol. II which have been especially revised are those on the operations for empyema, the etiology of pleural exudates, subphrenic abscesses, operations upon the lungs, tuberculosis of the mamma, chronic cystic mastitis, fibro-adenoma mammae, kidney and intestinal injuries, the etiology and treatment of peritonitis, preperitoneal suppuration, tuberculous peritonitis, tumors of the umbilicus, tumors of the liver, diseases of the gall-bladder, gastric hernia, intestinal operations, treatment of nephro-lithiasis and tumors of the kidney, and the operations for prostatic hypertrophy.

The last volume has been especially revised and enlarged. The sections which have been most noticeably revised are those upon scoliosis, tumors of the spinal column, syphilitic diseases of the fingers, operative treatment of old and irreducible luxations, congenital dislocation of the hip, iodoform injection in tuberculous arthritis, treatment of ulcers of the leg by means of detached skin-flaps, operations for varicose veins, necrotomia tibiæ, neuralgia of the foot, congenital diseases of the shoulder-joint, and cubitus valgus and varus.

Professor Koenig is to be congratulated on this last edition of his great work,—a work which during sixteen years has appeared in six editions, and which ever retains its high position of favor among the surgeons and students of the continent of Europe.

JAMES P. WARBASSE.

TUMORS, INNOCENT AND MALIGNANT. Their Clinical Features and Appropriate Treatment. By J. BLAND SUTTON, F.R.C.S., Assistant Surgeon to the Middlesex Hospital, London. Octavo, 526 pages, with 250 engravings, and nine full-page plates. Philadelphia: Lea Brothers & Company, 1894.

This book has been written by Mr. Sutton with the idea of combining in the consideration of the subject of tumors both pathological and clinical knowledge. The result is a most readable and instructive book, of especial practical value to the physician and surgeon in general rather than to the pathologist as a specialist. The biology of tumors is an attractive field to the author, and in this department of the subject he is always at his best, drawing often from the field of comparative pathology to illustrate his subject. The fulness of minute detail required in a text-book of pathology is wanting, so that this book is not to be considered as a hand-book for laboratory use. Its treatment is rather a general one, dealing with broad facts and elementary principles. The illustrations are very abundant, and have evidently been chosen because their subjects are types of the classes described rather than because they are peculiar or unusual. A much more abundant presentation of drawings illustrating the minute anatomy of the various growths would, however, have added to the value of the work. Such subjects as glioma, neuroma, myxoma, and angioma are discussed without a single illustration showing the characteristics of their minute structure, and even the chapters on dermoids, which otherwise are especially full and satisfactory, are defective in this respect.

From the list of tumors he properly excludes all inflammatory

new growths due to the irritation of parasitic organisms,—*i.e.*, tubercular growths and syphilomata and actinomycotic growths. He retains, however, echinococcal hydatids, which are quite as distinct in their nature from those growths to which the treatise is devoted as are the infective granulomata proper. He then divides tumors into the four great groups of (1) connective tissue tumors; (2) epithelial tumors; (3) dermoids; and (4) cysts. Under each group the proper subdivisions are in turn considered, and of the more important species their special characteristics, as they occur in different organs or locations, are studied. The proper treatment and the results to be expected from treatment are quite fully detailed with each group. In the light of the cases published by Abbe in the *ANNALS OF SURGERY* for January last, it is interesting to note the author's declaration (page 121) that nephrectomy for renal sarcoma in children is absolutely unavailing. This opinion is based upon a series of fourteen operations, tabulated by the author, six of whom recovered from the operation, but, nevertheless, all died within a year from the disease. The remaining eight died from the operation. This but illustrates the necessity for recasting surgical dicta from time to time.

Mammary cancer from its frequency and fatality can never cease to be a subject of absorbing interest. It is given full consideration by the author. Exception, however, may well be taken to some of his teachings as to treatment, that they are not radical enough. In general he states that "the treatment which, with our present knowledge, offers the best prospect to individuals affected with mammary cancer, is early and complete removal of the diseased gland and pectoral fascia." He further classifies these cases into (1) Where the cancer is limited to the breast, does not implicate the skin or pectoral muscle, and has not induced appreciable enlargement of the axillary lymph-glands. For these, the extirpation of the breast and removal of the pectoral fascia, he says, "may be expected to give good results both immediate and remote." We cannot but think, however, this teaching to be fraught with danger; we are disappointed that greater

stress is not laid upon the fact that whenever carcinomatous degeneration can be detected in a breast the strong probability is that the lymphatic channels leading through the pectoral fascia into the pectoral muscle, and along the border of the muscle up to the axilla, have already become infected, and that no reasonable certainty can be secured in any case that all disease has been removed without the removal of the underlying great pectoral muscle, and of all the connective-tissue and glandular contents of the axilla, at the same time with the breast. Such a practical conclusion is the direct logical deduction from the pathological facts. We shall look for its statement in future editions of Mr. Sutton's book, for no one can appreciate the pathological conditions in such cases better than he. It matters not at all that such early wide dissemination is not always present; the important fact is that in the majority of cases it is, and that there is no means by which its absence can be certainly predicated, so that safety lies alone in treating every case as if that one was typical of the worst phase of the disease.

The second class of the author includes cases in which the cancer implicates the skin, but has not yet ulcerated,—moderate enlargement of lymph-glands.

For such cases he advises extirpation of the breast, cutting wide of the implicated area of skin, dissecting away the pectoral fascia and removal of the axillary lymph-glands, by which means he thinks that a long immunity from recurrence will be enjoyed by many such patients. The third class embraces those in which the cancer is ulcerated but the extent of skin implication is small; there is no adhesion to the chest-wall. The axillary lymph-glands are enlarged. Such cases, he thinks, may be submitted to operation, not with the hope of prolonging life, but simply in order to rid the patient of what will become foul, offensive, and a source of mental anguish. He lays down a series of five conditions in which it is inadmissible to attempt any operation. We will not quote them here, but simply make this general observation that the experience of some surgeons has shown that by sufficiently extensive removals of tissue some apparently

hopeless cases of cancer can be rescued. The author attaches too much gravity, we think, to *évidement* of the axilla, saying that it transforms a simple and safe operation into one often fraught with danger. To this we must take positive exception, for present abundant experience will sustain the accuracy of the statement that the operation of clearing out the axilla, in cases in which the tissues have not become matted together by adhesions and infiltrations,—that is to say, during the early history of mammary cancers,—when done by a skilful surgeon, is attended with no mortality, and entails no resulting serious disability. Its dangers are infinitely less than those which attach to the probable existence of early, though still unappreciable, infection of the axillary lymph-glands.

In view of the position of the author with regard to the treatment of mammary cancer, one is not surprised to find that in the treatment of uterine cancer he does not recommend the removal of the whole uterus except in cases of primary cancer of the body of the organ.

The book closes with a chapter each devoted to “The Zoölogical Distribution of Tumors,” and to “The Cause of Tumors.” The concluding paragraph of the book is worthy of reproduction here. It is as follows :

“It is a noteworthy fact that most pathologists who have taken comprehensive views of tumor-formation, and have made it a subject of serious and prolonged study, are of opinion that tumors innocent and malignant are, in the beginning, local troubles, and that the safest and most effectual method of dealing with them may be expressed in one short sentence :

“Thorough removal of the tumor, whenever this is possible, at the earliest possible moment.”

The book is of comfortable size to handle, is printed in good readable type, is profusely illustrated, and the author’s style is clear and graphic.

L. S. PILCHER.

TREPHINING IN ITS ANCIENT AND MODERN ASPECT. By JOHN FLETCHER HORNE, M.D., D.Sc., F.R.C.S. (EDIN.). London: John Bale & Sons, 1894. Crown 8vo., illustrated, pp. 133.

"The opinion expressed by Thucydides in the beginning of his history,—‘But, judging from the evidence I am able to trust, after most careful inquiry, I should imagine that former ages were not great, either in their wars, or in anything else,’—is so prevalent among physicians and surgeons at the present day that old writers are, I think, unduly neglected. Many books lie on the shelves, and much that is interesting remains unknown from the widespread belief that our professional ancestors wrote nothing worth reading now. A little study of medical writers corrects that notion, and every one who takes the trouble to read the works of the best men of past times will find much food for reflection in their observations, their arguments, and their errors."

This extract from Dr. Horne's brochure explains the reason for the presentation of this interesting historical study. The book does not claim to contain much original material, though the cases taken from the author's private cases are new and interesting. His aim has been "to rescue valuable matter from oblivion, and to render it more accessible." A careful perusal of the book shows that the effort has been successful.

Nearly half of the book is devoted to the early history of the trephine. As no subject of medicine has created more diversity of opinion than the use of this instrument, the various views of the Fathers of Medicine are of practical value as well as of historical interest. To one who has not given the subject especial attention, the idea that trephining was one of the earliest of surgical procedures is a novel one. Even the neolithic men who inhabited Europe several thousand years ago practised the art, and the various dolmens and mounds which have been opened in Europe and in America furnish abundant proof that sharp flints in skilful hands are capable of producing as good results as the trephine or mallet and chisel in pre-aseptic days. Broca's investigations are extensively quoted, as this

eminent authority did more than any one else to settle the question of prehistoric trephining.

With the advent of a higher civilization and written records even the earliest writers upon surgery recognized the fact that extravasation of blood and the formation of pus between the skull and the membranes of the brain were the two principal causes of bad symptoms and of death in fractures of the cranium; and that the only rational method of obtaining relief in either case was by making such an opening in the bone as would permit the escape of the fluids. The various instruments that have been devised to accomplish this result are shown in a number of illustrations. Cycliscos, meningophylax, terebra, scalper cavus, modiolus, and trochlea triplex form an interesting series. Dr. Horne has been thorough in his research, and the extracts from the ancient writers which are given are many of them as curious as the instruments themselves, although they contain the germs that have ultimately developed into modern surgical practice.

The modern application of the trephine is also thoroughly discussed, and the arguments for and against the operation given by different surgical authorities are well presented. A number of cases from the author's private practice are cited in this portion of the book. Trephining in intracranial extravasation, abscess, cysts, tumors, meningitis, general paralysis of the insane, epilepsy, idiocy, mania, gunshot wounds of the head is described concisely in each case, and valuable statistics and comparisons are given. Trephining of the spine is also made the subject of a chapter, and the difficulties and dangers of this procedure are pointed out. Dr. Horne himself does not regard this last operation as justified by statistics or by experience, save in exceptional cases.

The book closes with a general survey of the subject, and a comparison between modern and preantiseptic results. Cerebral localization is outlined in its surgical relations. The advances in this realm of surgery, due to American workers, are fully recognized, and many quotations are made from the works of American writers.

Dr. Horne is evidently a man who combines considerable

literary ability with his skill as a surgeon. He writes with precision, and yet in a particularly smooth and graceful style. His familiarity with the classics, as well as with modern literature, has enabled him to choose extracts and illustrations from the original texts, and these he has deftly blended together into a homogeneous whole. Much of the subject-matter is so old that it is really new, and we must commend the author for acting upon Dr. Arnold's suggestive thought,—“The harvest gathered in the fields of the past is to be brought home for the use of the present.”

H. P. DE FOREST.

THE MEDICAL ANNUAL for 1894. Bristol: John Wright & Co.

The twelfth volume of this excellent work is fully up to the high standard attained in the previous issues. The chapters to which especial attention may be directed in the volume now under notice are the following:

An excellent account of Appendicitis, by Mr. Gilbert Barling and Dr. William Bull, of New York. The article is illustrated by a useful plate and by many figures, and represents the latest information as to the pathology and treatment of this disease.

Dr. Ogston gives an account of his Especial Operation for the Treatment of Cancer in the Submaxillary Region. The review of the progress in the treatment of the ear-diseases, by Dr. Dundas Grant, is thoroughly critical and most valuable. The same may be said of the well-illustrated article on diseases of the eye, by Mr. Simeon Snell. The section on Facial Expression in Insanity, by James Shaw, will attract attention, not only on account of its lucid description, but by reason of the admirable photographs with which the article is illustrated.

Mr. Mayo Robson contributes the section on Intestinal Surgery and on the Surgery of the Liver.

Professor Hamilton, of Rush Medical College, Chicago, has a short note on Syphilitic Myositis. Professor J. Madison Taylor, of Philadelphia, deals with Enuresis in Children; and Professor Hare,

of Philadelphia, contributes a good and valuable critical summary under the title of *The Therapeutic Gains of 1893*.

The book maintains its position as a valuable guide to the busy practitioner, and the present volume can be in every way strongly recommended.

FREDERICK TREVES.

TRANSACTIONS OF THE SOUTHERN SURGICAL AND GYNÆCOLOGICAL ASSOCIATION, Vol. VI. Sixth Session held at New Orleans, La., November 14, 15, and 16, 1893. Published by the Association, 1894.

This volume contains thirty-seven papers with their discussions. They comprise many valuable contributions. As would be expected, much is said about the branch of surgery pertaining to the diseases of the female pelvic organs. The remarks upon this subject made by general surgeons are, as a rule, sound and instructive, while those made by professed gynæcologists are often biased and smack of a deficiency of general surgical knowledge.

In his annual address the president says, "The gynæcologist taught the surgeon the invaluable lesson that the abdominal cavity could be opened with impunity, and its organs exposed, handled, and treated successfully. The grand lesson was taught in the wilds of Kentucky more than seventy years ago." True; these things were done in the wilds of Kentucky; but they were done by a surgeon skilled in all the branches of his art, especially experienced and successful in lithotomy, in the operation for strangulated hernia, in tracheotomy, and in the various amputations,—the surgeon, Ephraim McDowell, friend and student of the surgeon, John Bell.

Let us hope also that the speaker is mistaken when he says that "sepsis is no longer an idea or a theory. It is an established fact, and has come to remain with us for all time." His address abounds in good-fellowship, and he endeavors to sweep away all trace of sectional lines. He would, however, have been justified in thinking the Northern gynæcologists were not too well grounded in pathological

anatomy when a Philadelphia gentleman said that he agreed with a prominent New York gynæcologist that endometritis "is altogether an exceptional disease, and that in the hands of large numbers of men finding it so, it is a fanciful disease and not a real one." It was this same gynæcologist who, in discussing the paper on the conservative treatment of pyosalpinx, said, "I want to say that the surgery done in America to-day commenced in the backwoods, and the best surgery has remained in the backwoods."

Papers of especial value were contributed by McGuire, Tiffany, and Briggs.

The volume is well printed and neatly bound. It does the Southern Association credit, and makes the home talent show to a very good advantage by the side of their visitors from the North.

JAMES P. WARBASSE.

PETIT MANUEL D'ANESTHÉSIE CHIRURGICALE. Par FÉLIX TERRIER, Professeur à la Faculté de Médecine de Paris, et M. PÉRAIRE, Ancien Interne des Hôpitaux de Paris. Avec 37 figures dans le texte. Paris, 1894 : Ancienne Librairie Germer Baillière et Cie.

This excellent little volume opens with a chapter on the history of surgical anæsthesia. Long is given the credit of first having employed ether for purposes of general anæsthetization.

The authors give a thorough review of the different methods of producing anæsthetization, both local and general. The various methods are given for obtaining the best results with the different narcotizing agents.

The text is clear and concise, and the work recommends itself for the large amount of practical information which it contains, and for the absence of moot and unsettled questions. It is devoted to the facts which have been learned by practical men.

JAMES P. WARBASSE.

TREATMENT OF CONGENITAL DISLOCATION OF THE HIP.

By E. H. BRADFORD, M.D.,

OF BOSTON.

THE methods for treatment of congenital dislocation of the hip are—

(1) By apparatus; (2) By forcible reduction without traction; (3) By operative reduction.

The treatment by apparatus, consisting of the application of corsets pressing upon the trochanters to check the increase of the sinking of the pelvis between the hips and the lordosis, is certainly palliative rather than curative. The same may be said of treatment by traction appliances and ischiatic supports.

The treatment by traction recommended by Guérin, Pravaz, and more recently in a much more complete form by Buckminster Brown, cannot be regarded as reliable or generally practicable.

The methods of treatment by operation which have been suggested are numerous; that of reduction after subcutaneous tenotomy of the muscles would, in view of what is shown by dissection and pathological specimens, appear inadequate.

Treatment by excision practised by Rose, Huesner, and Margary, hardly recommends itself as justifiable, unless in painful or helpless cases, and even in these in double congenital dislocation it would seem of doubtful advantage.

The cases where the methods of forcible reduction under anæsthesia would be successful are certainly few. The method has been tried by Post, of Boston, and by Paci, who reports success in some instances, but such cases must be of the lightest variety.

The method, which at present is attracting especial attention, is that advocated by Hoffa, of Würzburg,—namely, operative reduction of the congenital dislocation.

Hoffa himself has operated in twenty-four cases, and claims satisfactory results in most cases. His final conclusions he promises to publish later. He operates by preference on young children.

Mollière¹ reports two successful cases.

Denucé, of Bordeaux, reports a case of a child of six operated on by him. The left trochanter major was three centimetres above the Nélaton line, and after operation the head of the trochanter was not above the Nélaton line. A year afterwards the patient was in good condition. There was no lordosis and little scoliosis. The difference in the length of the leg was about two centimetres, having been about five centimetres before.

Kirmisson,² in an excellent article on the subject, reports seven cases of the operation, with two deaths, and five satisfactory results. Of these five, three of the results are reported to be excellent.

Broca reported a death from this operation.

Lorenz, who has operated in a number of cases, mentions a case of septicæmia, and Kirmisson knows of a few fatal cases in the hands of other surgeons, which he is not authorized to mention.

Hoffa himself has had one death.

The method of operation is described by Hoffa in his work on "*Orthopædic Surgery*," page 532,—

"After opening the joint by means of a Langenbeck incision, and subperitoneal separation of all the soft parts from the trochanter major, it is possible, in young patients to the age of seven, to place the head of the femur, by a flexion of the thigh and direct pressure, into the normal acetabulum. Without separation of the soft parts, even after the joint is opened, it is impossible to effect a reduction, but after the reduction of the head with the knee and hip flexed, if

¹ *Lyon Médical*, 1887, No. 9.

² *Revue d'Orthopédie*, 1894, p. 186.



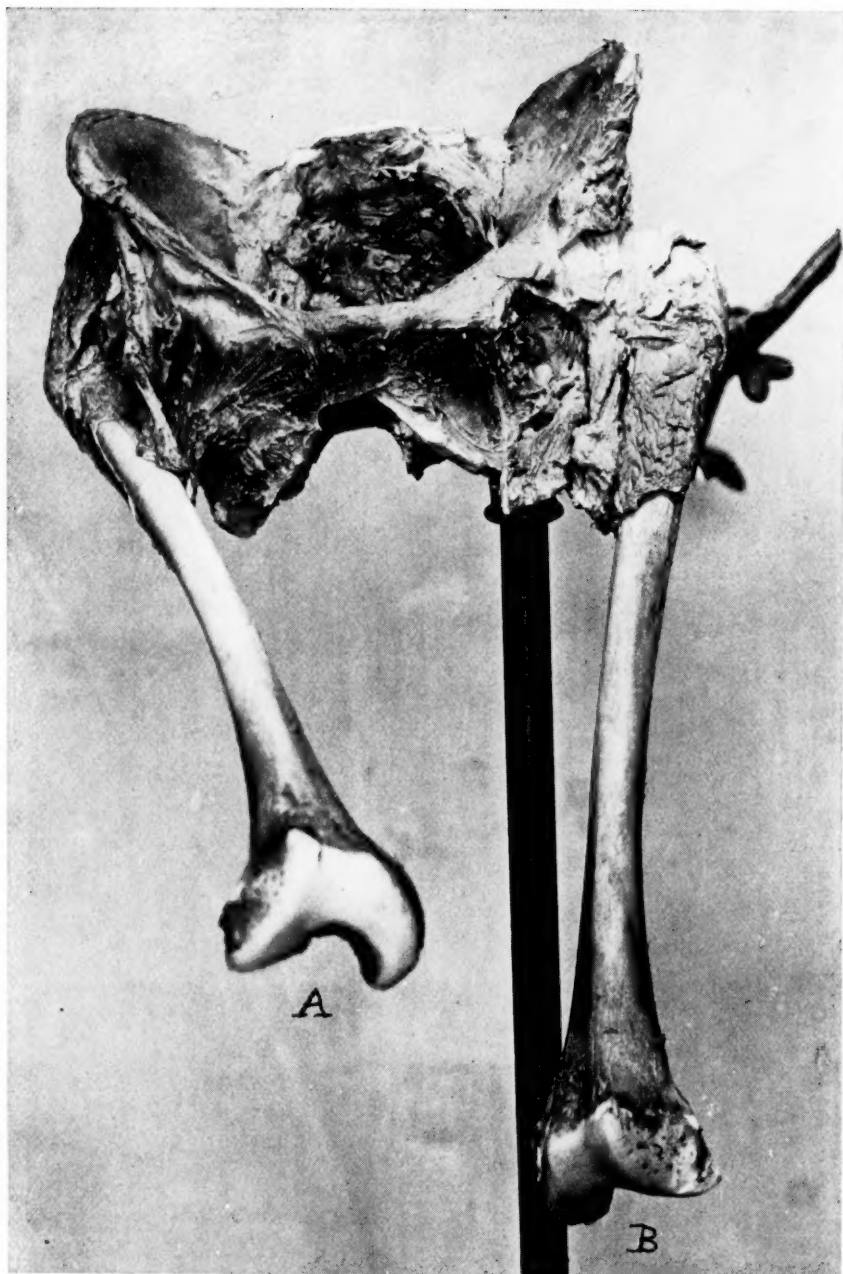


FIG. 1.—Anterior view of a specimen of double congenital dislocation of the hip, after removal of superficial soft parts. A, femur not operated upon; B, operated upon, with improvement in position, but still not in normal position.

an attempt is made to straighten the knee, the head of the femur slips out of the acetabulum. It is, therefore, important that the head should be kept fast in the acetabulum, while an assistant gradually stretches the biceps, the semi-membranosus and the semi-tendinosus."

Hoffa also advises the subcutaneous division of the fascia lata, and the muscles which pass from the spine of the ilium. The second step of Hoffa's operation is the making of a new acetabulum. This is done by means of a Volkmann's curette, made in the shape of a bayonet, which, under the guidance of the forefinger, chisels out the whole of the acetabulum. Care should be given that the borders of the acetabulum remain strong. Hoffa claims that in a normal infant child's pelvis the ilium is thickest at the point where the acetabulum should be made deeper in a congenital dislocation. The third step of the operation consists of the reposition, which is recognized by the characteristic sudden motion of the head of the femur, as in reduction after traumatic luxation.

Hoffa claims that the obstacle to reduction is the shortening of the soft parts which surround the dislocated hip. This view is disputed by Karewski, who thinks that the altered shape of the bone interferes with the reduction, and by Lorenz, who thinks that the shortened adductors also prevent reduction.

The obstacles to reduction and the difficulties to be met in operation are well illustrated by a specimen represented in the accompanying illustration. (Fig. 1.)

The specimen is from a child nine years of age, somewhat older than is most suitable for the operation, who died from diphtheria and septicæmia a month after Hoffa's operation. The wound had nearly united a week after the operation, the child's temperature, however, was elevated, and a diphtheritic membrane appeared in the throat; the wound afterwards became septic, and at the autopsy evidences of extensive diphtheria and of septicæmia were found. An abscess near the hip had formed, passing from the inner side of the pelvis running upward in the sheath of the iliac muscle.

During the operation, which was conducted with the usual care, according to the steps mentioned by Hoffa, it was impossible to draw the head down as far as the Nélaton line. The finger was inserted, and a point found where the acetabulum should be as far as could be determined by touch, and this was curetted and drilled out, forming, as was thought, an acetabulum of sufficient depth. It was impossible by any form of traction to bring the trochanter lower than was done.

Although all the muscles had been divided and removed, it was impossible to pull the femur into its normal position. Reduction was possible by manipulation,—*i.e.*, flexion and rotation; but dislocation occurred if an attempt was made to straighten the femur from the flexed position which it takes if the head is put into the acetabulum. The specimen shows that the obstacle is clearly the anterior and strongest fibres of the capsular ligament. On the side not operated upon, it is impossible to reduce the dislocation by any method, either by traction or manipulation. The specimen also shows that although the curette was used at a point which at operation appeared to be the proper position, yet it did not enlarge the normal acetabulum, but was at a considerable distance above this place. (Fig. 2.)

It would also appear that Kirrison is correct in claiming that facts do not support Hoffa's belief that the portion of the ilium in congenital dislocation, that it is desirable to curette for the deepened acetabulum, is the thickest portion of the ilium. This was not found to be the case in any of the four specimens at the Warren Museum in Boston.

The clinical experience which the writer has had personally in the treatment of this deformity may be stated briefly as follows:

One case. Aged six. Treatment by mechanical means,—*viz.*, the use of an ambulatory traction appliance which was worn for two years, showed no change in the deformity.

One case. Aged three. Treatment by an attempt at forcible reduction under ether without success.

Three cases. Treatment by recumbency and traction for a long period.

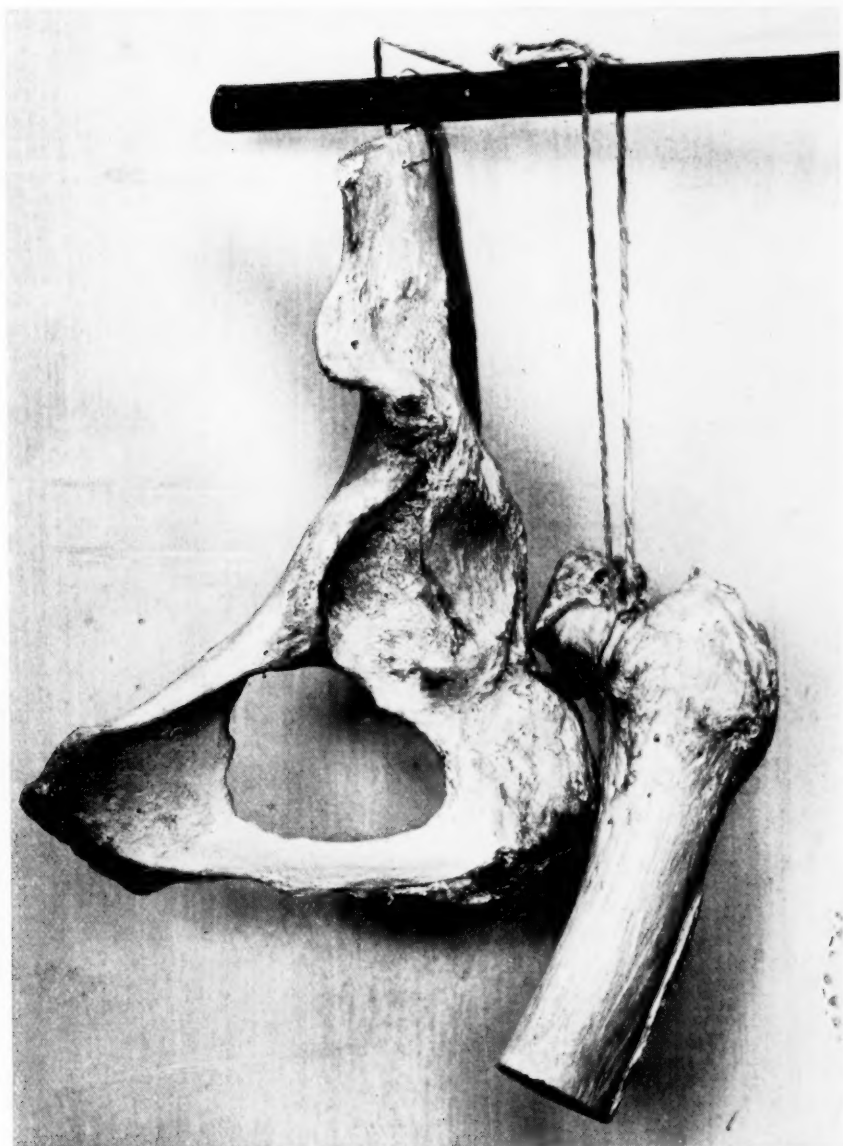
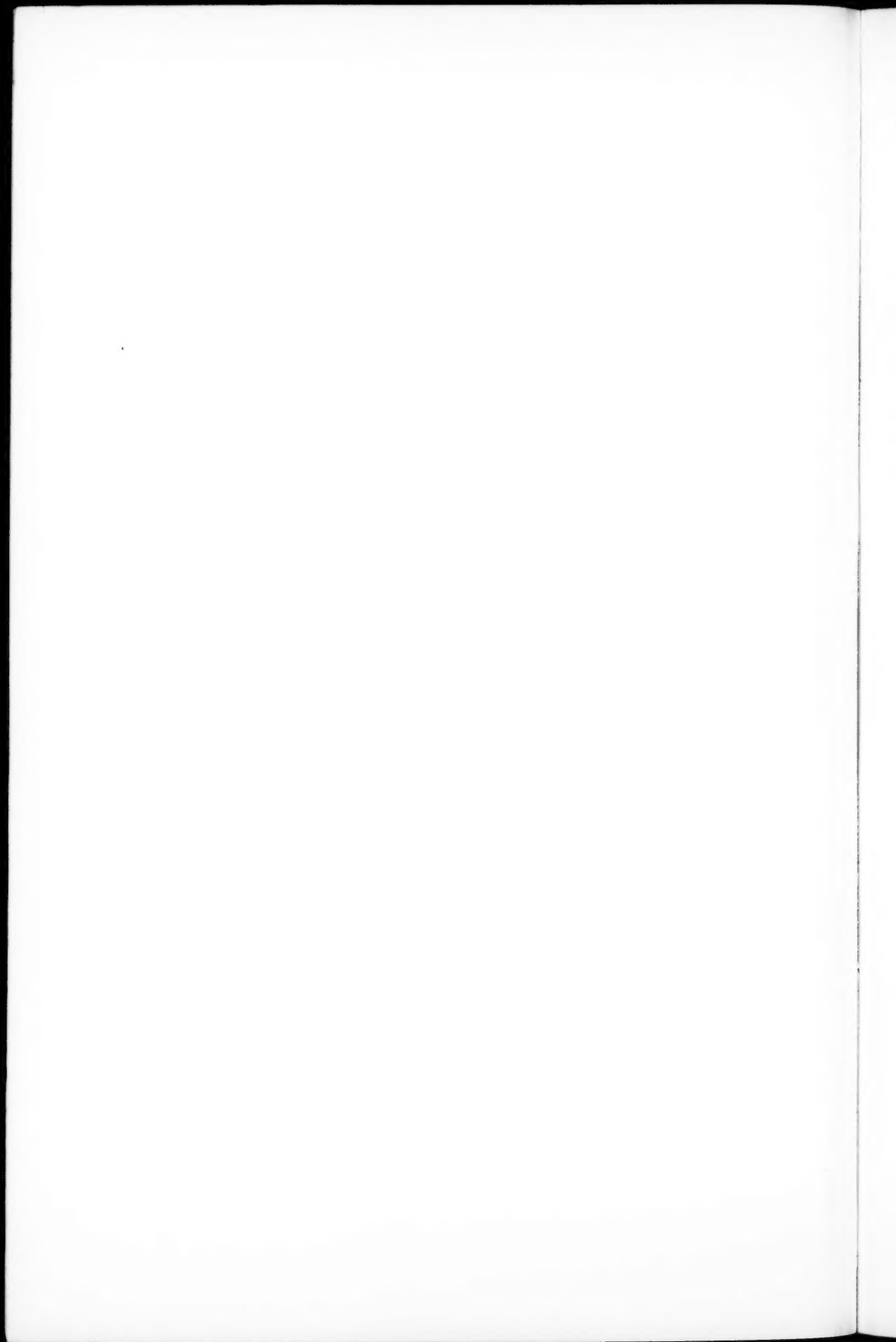


FIG. 2.—View of innominate bone and head of femur from a case of congenital dislocation of the hip, after operation for formation of new acetabulum and reduction of the dislocation.



CASE I.—Aged five. Treatment by recumbency for a year with traction. Afterwards by traction appliances and crutches for two years, and subsequently by a corset pressing upon the trochanters. An increase in the deformity occurred in this case. The patient at present walks badly. The deformity was double.

CASE II, a child eight years of age, was treated for six months by recumbency and traction. Afterwards for four years by a leather corset (stiffened with steel) pressing upon the trochanters. The patient's figure has improved. No increase in the deformity occurred in the five years during which she was under observation, and at the present time the patient walks quite well with but little waddling in gait. The deformity was double and the patient strong. The patient is at present sixteen years of age.

CASE III (double) was treated for three years by recumbency, the treatment beginning when the child was three years of age. The case is reported¹ elsewhere with details of apparatus. Subsequent treatment was by ischiatic crutches, which were worn for two years, and at present a leather corset pressing upon the trochanters is worn. There has been a reduction in the deformity, the trochanters standing lower than before treatment was begun. The patient walks well and the trochanters remain fixed and cannot be pushed up or down, but they remain an inch higher than the Nélaton line, though formerly an inch and a half.

Five operations according to Hoffa's method:

- A. F., three years old. Double deformity. Two operations.
- A. W., three years old. Single deformity. One operation.
- M. C., three years old. Single deformity. One operation.
- M. Col., three years old. Double deformity. Two operations.
- H. K., Eight years old. Double deformity. One operation.

The results in these cases can hardly be considered satisfactory. In all except the last the wound healed up thoroughly and well. In the last, the wound, a week after operation, was progressing favorably, but the child was seized with diphtheria and died three weeks later with diphtheria and sepsis of the wound, being the case the specimen from which is presented in this paper.

In the case of M. Col., the first operation healed readily, but a week after the second operation the patient was taken with scarlet fever and died.

¹ Transactions of the American Orthopædic Association, Vol. IV, p. 308.

In the case of A. W., the wound healed, but the child died with symptoms of diarrhœa and vomiting, a month after operation, apparently without any connection with the operation, the wound having entirely healed.

In the surviving cases, A. F. and M. C., the patients recovered well from the operations (double in the first and single in the second case). It did not appear, however, that the head of the femur was well fixed in the new acetabulum in either of the cases, or that the patient had been materially benefited by the operation.

The three deaths can hardly be attributed fairly to the operation, the first two occurring at a time when the hospital was visited by an epidemic of contagious disease. It is probable, however, that the operation may have diminished the patient's power of resistance, in both these cases as in the third case.

The obstacles which the writer has met in Hoffa's operation are: first, the difficulty of exactly determining the location of the true acetabulum; second, the difficulty of complete reduction; and third, the difficulty in retention of the head when thoroughly reduced. The first of these difficulties can, in a measure, be met by an increased experience with the operation. The second of these obstacles is overcome by Hoffa, not only by the severance of the muscles from the head of the trochanter, but also by a complete freeing of the capsule from the neck of the femur. This is accomplished after opening the capsule from behind and thrusting the femur upward through the wound and freeing the capsule from behind forward.

Hoffa finds his best success in younger children, and is unable to effect a reduction in children of advanced age in adolescence.

Lorenz advocates an anterior incision.

In view of the evidence given in the pathological specimens here reported, it seems clear to the writer that the chief obstacle to the reduction lies in the ilio-femoral bands of the capsular ligament (the so-called Y ligament of Bigelow), and that for a thorough division of these fibres it is better to open the capsule from the front—than from behind—as the strongest bands are on the anterior surface.

Through the courtesy of Professor Dwight, and with the assistance of Dr. Prescott, a number of dissections of the hip-joint were examined, which displayed the attachments of the capsular ligaments of the hip, seen in their anterior and posterior aspects. Operative procedures were tried upon cadavera and the following lines of incision were found to be of advantage: A long incision is made on the outer side of the thigh, reaching from one inch above the trochanter to two inches below. The incision penetrated to the head of the femur, the neck, and along the outer border of the trochanter. The incision is slightly in front of the external border of the trochanter. The soft parts are retracted, and the attachment of the muscles to the head of the great trochanter separated, the anterior aspect of the neck of the femur and the adjacent trochanter freed, and the soft tissues retracted so as to lay bare the neck of the femur on its anterior aspect, and an incision at right angles with the axis of the neck freely made, thoroughly dividing the attachments of the Y ligament near the intertrochanteric line of the femur. After this is divided, it will be found that after the cotyloid ligament is incised the head of the femur can readily be pulled down an inch; in congenital dislocation, where the cotyloid ligament is not present, no difficulty will be met in placing the head where it is desired after division of the contracted soft parts. The operation would, therefore, consist in making, under aseptic precautions, a compound dislocation of the head of the femur, removing it from its abnormal socket and placing it in the normal socket, dividing all tissues which prevent reduction.

The incision here mentioned would seem to have the advantage over the method described by Hoffa in dividing more directly the most resistant checks to reduction. It is probable that, in the successful cases which Hoffa reports, the attachments of the capsular ligament have been thoroughly freed, but it would seem to the writer that this would be accomplished with certainty in the incision recommended only by a surgeon of Professor Hoffa's skill and experience in the operation.

It has occurred also to the writer that, in all probability, if an anterior division of the strong ilio-femoral capsular bands were to

be made freely, older cases would be operated upon with better success than those of the age recommended by Hoffa, for no direct obstacle exists to reduction even in adolescent cases except the contraction of the soft parts.

The incision which seems to the writer most suitable may be briefly described as a primary side incision along the trochanter (in front of the line of the Langenbeck incision) and a secondary deeper cross-cut on the anterior surface of the capsule near the intertrochanter line of the femur.

Instead of this incision, the Lorenz incision, *i. e.*, an anterior incision directly over the neck and exposing at once the anterior face of the capsule, naturally suggests itself. This has its advantage, but the attachments of the muscles to the greater trochanter are not so readily freed as by the side incision, and drainage is not so well provided for, which in a deep wound is of importance.

Since the experiments were made upon cadaver, the writer has had an opportunity of performing the operation on a living subject, a child four years of age, with a congenital dislocation of the hip on the right side, the result confirming the conclusions reached by anatomical investigations. The operation was done in the manner just mentioned, and reduction was made readily, the head of the femur slipping without difficulty into the acetabulum. It was found, after the attachment of the muscles to the trochanter had been divided, that on flexion of the limb, reduction by manipulation was readily made, but on attempting to straighten the limb, the head of the femur slipped instantly from the normal acetabulum. After, however, the anterior bands of the capsular ligament were freely divided, the head remained in its socket without difficulty in whatever position the limb was placed, without the use of traction. Some contraction of the adductor muscles was found on extreme abduction of the leg. The most resistant fibres of the adductor magnus were divided by open incision. The patient has recovered from the operation, the wound has healed, but, as only six weeks have elapsed since operation, the ultimate result cannot be reported as yet. The case can, however, stand as evidence of the readier method of successful reduction.

The writer has found difficulty in retaining the head of the femur in the acetabulum into which the head is reduced after an operation. It has appeared to the writer that this difficulty is perhaps due to the fact of imperfect reduction, but especially to imperfect lengthening of the string, the shortened tissues on the anterior surface of the capsule. If these ligamentous bands are short, dislocation is easy, whatever the depth of the acetabulum may be. It would appear, from the specimens examined, that the curette is not necessary in young children, as an acetabulum appears to be present.

The conclusions which the writer has formed from such experience upon the subject of congenital dislocation as has come to his knowledge are briefly as follows: (1) That the methods of treatment by traction, or by mechanical means, crutches, splints, recumbent traction, with or without tenotomy, do not effect a cure; (2) correction by means of forcible reduction without incision can be applicable in but few cases, and is not reliable; (3) that the method of operative reduction offers the best prospect of a cure. The method at present, however, involves risks, and is not certain in its results, but it is to be expected that further experience will give greater precision and more certain results, as no inherent difficulties lie in the way of operation; that the condition of the shortening of the muscles, the shortened condition of the anterior bands of the capsular ligament (described by Bigelow as the Y ligament), forms an important obstacle to complete reduction, and that these fibres should be thoroughly divided. It is also the opinion of the writer that these fibres can be more thoroughly divided by incising them from in front than from behind.

TREATMENT OF CONGENITAL DISLOCATION OF THE HIP.¹

By T. HALSTED MYERS, M.D.,

OF NEW YORK,

ORTHOPÆDIC SURGEON TO ST. LUKE'S HOSPITAL; ATTENDING SURGEON
TO THE NEW YORK ORTHOPÆDIC DISPENSARY.

EVERY year a very considerable number of cases of congenital dislocation of the hip present themselves at the New York Orthopædic Dispensary, and I have also seen some cases in my private practice, so that I have notes on 113 cases, but they are very fragmentary, and most of the cases have been sent away for one reason or another without treatment.

Until recent years, although occasionally a good result was recorded where the surrounding conditions had all been most favorable, the prognosis generally was altogether too poor to make either surgeon or parents undertake a course of treatment without great reluctance. Thus it happened that when these children had pain in the joint they would wear some supporting splint for a time or use axillary crutches until the pain disappeared. If the limp was very much exaggerated, a high sole of the proper height was ordered for the short limb. Increasing in this way the elevation of this foot was theoretically bad practice, since the affected side of the pelvis was thereby raised and the more perpendicular position of the dorsum of the ilium offered less resistance to the slipping upward of the head of the femur. Practically, however, I could not determine from my notes that the cases treated with the high shoe showed any greater subsequent shortening than the other cases.

In none of my cases was there pronounced flexion or ad-

¹ Presented to the American Orthopædic Association, May, 1894.

duction. There are so many cases on record, however, which show great disability from these deformities that we must remember that they occur when we make our prognosis.

Thirty-one per cent. of these cases suffered from pain at times. The usual story was that after jumping rope, or taking a longer walk than usual, or after carrying some weight, pain was felt in the hip. Sometimes it was severe and lasted several months; generally it disappeared after a few days' rest in bed. These attacks of pain seem to be especially apt to develop during the periods of very rapid growth. They were very common in girls from eleven to fourteen years of age. In those who did complain of pain the attacks were generally recurrent. These cases seemed to show also a considerable amount of shortening, perhaps more than the average. In one case the recurrence of pain was noted soon after childbirth, which seemed to indicate that the ligaments about the hip-joint shared in the relaxation often found in the pelvic ligaments at the end of gestation.

In many of the cases I examined there was a spinal curvature, but they were due to the short limb, and therefore were not permanent, and were easily corrected. I attempted to determine the average shortening in untreated cases at the various ages, but my series of cases was not large enough to make the results more than suggestive. I only cite those years where I have at least five cases from which to take an average. These show that between one and two years the average shortening is $\frac{5}{8}$ inch; two and three years, $\frac{5}{8}$ inch; three and four years, $\frac{6}{8}$ inch; four and five years, $\frac{7}{8}$ inch; five and six years, $\frac{9}{8}$ inch; seven and eight years, $\frac{13}{8}$ inch; eleven and twelve years, $\frac{12}{8}$ inch; thirteen and fourteen years, $\frac{15}{8}$ inch. The shortening, therefore, pretty steadily increases with growth, as we should expect.

The same may be said of the limp. This limp seems to depend, however, fully as much upon the relaxed, unsteady condition of the joint as upon the amount of shortening. Some of the patients limp badly who have but little shortening, and *vice versa*. The lordosis seems to be a very distressing and conspicuous deformity in these cases, and in many of them there is considerable pain in the lumbar spine.

The treatment to be adopted will depend somewhat upon the age of the patient when presented. Hoffa says his operation should not be done on patients over ten years of age, and adds, "the younger the patient the easier it is." Lorenz has operated upon children up to fifteen years of age, but also advises earlier operation. Kirrison considers the best age between four and six years. One of the great advantages of Paci's method is that it apparently gets good results in children too old for other methods of treatment, and in the very young as well. Therefore in children under ten years, or especially under seven years, we have a choice of several methods of treatment: the old treatment,—*i.e.*, support during painful periods, and a high shoe and pelvic girdle at other times; Hoffa's operation or Lorenz's modification of this operation; Lannelongue's injections of chloride of zinc; the method of continuous extension, pelvic girdle, and, finally, walking-brace; or Paci's manipulations.

From ten to sixteen years Hoffa's operation is not recommended. In still older cases with severe and disabling deformities Kirrison's method of subtrochanteric osteotomy seems to benefit the patients considerably and without risk. Of these 113 cases, 74 were less than seven years of age when first seen, and 88 were under ten years. Judging from my own experience, in all these cases the shortening, which is due to the dislocation, can be overcome by continuous extension. It does not by any means follow that after this the head of the femur may be replaced in the acetabulum, nor that it will retain its position when traction is omitted. On the contrary, from an examination of the pathology it is very improbable that a true reposition can be made without an open operation, since the acetabulum, originally shallow, is generally still further filled up, and the hour-glass form of the capsule, usually present, would itself prevent a replacement. The relatively large size of the head would also prevent this. Then, again, even if replacement were possible, there is no sufficient bony barrier to prevent the head from slipping upward again when walking is attempted. As far as I know, every case treated by continuous extension and afterwards walking-apparatus has relapsed sooner or later after the apparatus was removed. The

celebrated case of Buckminster Brown¹ has relapsed, and from a personal communication from Lovett I hear that Dr. Post's case² "has suffered a slight relapse." I have just received a letter from Dr. Max Schede, however, in which he says he has completely cured four cases without operation by means of extension and the use of his splint, which holds the affected limb abducted always, even while walking. These four cases were from six months to eighteen months old when first seen, and treatment was continued for from one to four years.

I am convinced that by conservative treatment a great deal can be accomplished for these cases in some instances. The method necessitates two or three years or more of the most exacting care from surgeon and attendant, and is evidently impracticable for dispensary cases. This method has been very generally used, however, and I find that many of the surgeons to whom I sent a circular asking for information as to the results they had obtained recommended it highly, and claimed that the results were very good indeed: that the limbs were made strong and useful and the deformity insignificant. The general tone of the replies was that, considering this to be so, an operation involving risk of life was not justifiable. A large number of prominent surgeons had never had any experience with these cases.

In one case I have had under treatment I pulled the head down to its normal position by a long traction hip-splint. I also applied a pelvic girdle with a crescentic pad over the trochanter to make pressure and prevent slipping upward. Nine months later I began to move the hip in its new position carefully in order to create a new joint. The head of the femur seems under treatment to have changed its position considerably, as it is now almost over the acetabulum instead of on the dorsum. A much firmer support is afforded here by the anterior superior spine and its muscles, and less lordosis is caused. This position is, I think, the best one to be gained, if the head is not actually replaced in the acetabulum. In this case the shortening has increased very

¹ Boston Medical and Surgical Journal, 1885, No. 23.

² Bradford and Lovett, *Orthopædic Surgery*, page 519.

little, if at all, in the five years she has been under treatment. This change from a dorsal to an upward dislocation as a result of mechanical treatment I have not seen reported, but it has occurred after operations where the capsule was not opened,—the head slipping upward after the operation into this position. In the case I have described, however, there is still so much abnormal mobility that I doubt whether the improvement will be permanent after the brace is removed.

Injections of a 10-per-cent. solution of chloride of zinc are recommended by Lannelongue¹ for the purpose of exciting a bony growth at the site of the injection.

Lannelongue² says his proceeding may produce a certain amount of arthritis and thickening of the soft parts, but that this is advantageous. The long hollow needle of a Pravaz syringe is carried down to the bone and the injections made as much as possible subperiosteally. The injections may be repeated after three weeks to insure success.

In a child three years of age he made eight punctures, and in each deposited about two drops of the 10-per-cent. solution. In a second operation on the same child, three weeks later, he injected twenty drops, making two semicircular rows of punctures, one centimetre apart, for the purpose of increasing the bony deposit. The only bad symptom was a little fever after the second operation. Two weeks after the second operation a bony projection was apparent below the crest. It was deep-seated and attached to the ilium, hard and very prominent, and surrounded the great trochanter above and behind. Lannelongue also immobilized the hip, and used continuous extension to keep the head in good position during this treatment. The result seemed good in this case, and he reported it to the Congress of Surgeons, in 1891, as a cure.

Coudray³ reports a cure by this method obtained in a girl three years of age. After reduction of the shortening of three centimetres by Paci's method, two injections, at two months'

¹ *Semaine Médicale*, 1891, 510.

² *Bulletin et Mémoires de la Société Chirurgie*, Paris, 1891, XVII, 770.

³ *Congrès Français de Chirurgie*, 1892, p. 714.

interval, were made. Continuous extension in bed was maintained for five months. A month later the great trochanter was only one centimetre above Nélaton's line. The child was not allowed to walk, however, before the end of the year. This case remained cured, and was reported to the Congress of Surgeons again in 1893.¹

Jeuvell² reported three cases treated by these injections, repeated from two to five times. Two were cured, one of them a bilateral dislocation.

These are the only cases which I have been able to find reported as yet. The method is so simple that if it is as free from pain and danger as its author claims, it would seem a valuable addition to our treatment, especially after reduction has been attempted without opening the joint.

Gussenbauer³ attempted to excite this new bone-growth by opening the joint by Langenbeck's incision and inserting two or three steel nails in the posterior rim of the acetabulum. They were left *in situ* six weeks, but the results were not good. In one case the bone was so thin that the nails would not hold at all.

Resection of the hip-joint has been done a number of times for this deformity, but the results have been, as far as I know, always bad where both joints were affected, and generally bad also in unilateral cases, so that this operation is not to be recommended.⁴ In some very old and extreme cases, however, the head of the bone is so misshapen that it must be removed. Lorenz⁵ has occasionally found these extreme changes even in young subjects,—once in a child two and a half years old.

König's⁶ method of deepening the acetabulum by raising a periosteal flap from the ilium, inverting it, and sewing it to the capsule has been practically abandoned.

¹ Annales d'Orthopédie, December, 1893.

² Annales d'Orthopédie, August, 1893.

³ Annales d'Orthopédie, May, 1893.

⁴ For reports on twenty-seven of these cases, see Lovett's "Diseases of the Hip," p. 207.

⁵ Wiener klinische Wochenschrift, 1894, Nos. 11, 12, 13.

⁶ Verhandlung der deutsche Gesellschaft für Chirurgie, Berlin, 1891, xx, pp.

Karewski,¹ in February, 1889, opened the joint by an anterior incision and replaced the deformed head of the femur. It was a case of paralytic subluxation, and is the first, he claims, in which "bloody replacement" of a dislocated hip has been successfully done. By January, 1890, he had operated four times, and found that after the dislocation had existed for some time the acetabulum had to be enlarged to receive the head of the femur.

Hoffa published his operation in April, 1890,² for the first time. To his energy and scientific work, however, is due the greatest part of the popularity the operation known by his name enjoys.

He has very kindly sent me the advance sheets of the new edition of his work on orthopædic surgery, and I will briefly outline his operation as there described,—

Opening the joint by Langenbeck's incision; division of the capsule at its insertion in the neck of the femur; subperiosteal freeing of the great trochanter from all the muscles attached to it. In patients under five years old it is then almost always possible by flexion of the thigh and direct pressure upon the head to bring the head into the old acetabulum. The hip and knee now are often seen to be flexed. Hoffa overcomes this in young children by holding the head firmly in the acetabulum while an assistant gradually extends the leg on the thigh, so stretching the biceps, semi-membranosus, and semi-tendinosus. This is accomplished in three to five minutes.

In older children, six years and upward, it is generally better to divide these muscles, and this is done before opening the joint. Hoffa has adopted Lorenz's recommendation of dividing them at the tuber ischii. The limb is now abducted, and the adductors subcutaneously divided. The limb is now hyperextended and the soft parts attached to the anterior superior spine of the ilium, and the fascia lata are divided, by the open method so as to control better the hæmorrhage. These wounds are now dressed and then the joint is opened as described above. The head must be freed so completely that it can readily be brought out of the wound. Hoffa has never seen any necrosis of the head follow this free division. The ligamentum teres, if present, must be extirpated, and the insertion of the

¹ Centralblatt für Chirurgie, No. 36, 1892.

² Verhandlung der deutsche Gesellschaft für Chirurgie, XIX Kongress, p. 944.

capsule into the neck freely divided. A sharp Volkmann spoon, bayonet-shaped, is now guided by the index finger to the acetabulum, and the fatty tissue and cartilage and a good deal of spongy tissue are scraped out, taking care to preserve the edges of the acetabulum. The cavity must be made not only deep but broad. This is best accomplished by cutting away posteriorly.

The head is now reduced, and goes into place with a snap. If there is a rotation forward of neck and head, the limb must be put up in moderate inversion, otherwise the head will slip out of the new acetabulum. After a few weeks it may be brought to the normal position. Lorenz in such a case also advises putting the limb up in inversion, and a subsequent subtrochanteric osteotomy to correct this. The superfluous part of the capsule is extirpated, and the wound packed with iodoform gauze.

Small children are put in a fixation bed, with the limb abducted; older children in an extension dressing. In bilateral cases both sides may be operated upon at once.

Hoffa has operated seventy-five times now. All but the fatal cases were greatly improved by the operation. He wishes it understood that these children cannot be completely cured, since there is always more or less impairment of the nutrition of the limb independent of the shortening due to the displacement.

In bilateral cases he can reduce the waddling gait to a minimum, and can almost completely overcome the lordosis.

In unilateral cases he corrects the scoliosis and the shortening of the limb which is due to the dislocation. The limp which remains is not the characteristic disfiguring one of congenital dislocation, but that of a short leg. The new joint is firm, the motion is good, and is better the younger the patient is when operated upon. Ankylosis only occurs where there is suppuration, or where the acetabulum is not made broad and deep.

The first fixation dressing is kept on three to four weeks. Then massage and careful passive motion are used. After five weeks the child can stand and walk in apparatus which allows motion at the hip, but does not allow the head to escape from the acetabulum. This apparatus is worn until the joint is fully consolidated,—that is, for several weeks or months, according to the age of the patients. Bilateral cases wear only a supporting corset. At first the movements are not very easy on account of the imperfect adaptation of the head to its socket, but after walking, a return to the natural shape follows

the restoration of the normal relationship between the articular surfaces.

Lorenz's modification of Hoffa's operation consists in opening the joint by a vertical incision, directly below the anterior superior iliac spine. The capsule is very easily reached in this way; is laid freely open by a crucial incision and the acetabulum gouged out with less danger of injuring its posterior rim. Lorenz first laid especial stress upon the fact that the main resistance to reduction was offered by the muscles whose fibres took the direction of the shaft of the femur rather than those inserted in the great trochanter. Hoffa had spoken of the resistance offered by the muscles inserted into the tuber ischii and the anterior iliac spines, but had not realized apparently that this was the main resistance. Lorenz,¹ on the other hand, now finds that the gluteal muscles have fibres running parallel with the shaft, and therefore these fibres may offer resistance to reduction. These fibres are only in those parts where these muscles overlap each other.

Lorenz has also, I understand, modified his operation by making a transverse incision directly outward from his vertical incision in order to afford still easier access to the acetabulum. In his latest report, however, he says he has devised a new method which will require the division of only one muscle, the tensor vaginæ femoris. The details he has not as yet published. By his old method he often does not divide at all the muscles inserted into the great trochanter.

He treats his cases after the operation just as Hoffa recommends. In some cases where there was great deformity of the femoral head and a short neck, he found it necessary to put the limb up in considerable abduction in order to prevent it slipping up, and while this was not objectionable in unilateral cases, it would be so in bilateral cases if this position needed to be permanently maintained.

Both Hoffa and Lorenz advise now against any attempt to reduce the dislocation without opening the capsule and deepening the acetabulum. Such cases were found to relapse.

¹ Wiener klinische Wochenschrift, 1894, Nos. 11, 12, 13.

Broca uses a Langenbeck incision, but places it farther forward, so as to reach the muscles attached to the anterior iliac spines more easily.

Kirmisson¹ makes an incision from the anterior superior spine to the great trochanter, then down the shaft of the femur. In this way the insertions of the trochanteric muscles are easily detached, and the most direct access to the capsule is gained. He does not think the acetabulum can be enlarged as Hoffa says unless the excavation is made upward, which would necessarily cause shortening. He now voluntarily perforates completely the acetabulum, believing that the thick fibrous and muscular planes behind the acetabulum will protect the peritoneum from injury.

Kirmisson² has also lately reported some very good results obtained in old neglected cases with flexion and adduction by means of subtrochanteric osteotomy.

Ogston³ and others have reported good results in this class of cases by resection of the head of the bone and the formation of a new acetabulum on the dorsum of the ilium.

Paci's method of treatment consists in forcibly manipulating the limb as if to reduce a traumatic dislocation,—that is, the limb is first forcibly flexed as far as possible, then abducted, then rotated outward, then extended. Afterwards the thigh is held completely extended and immobilized, and traction is applied. If the shortening is not completely overcome at the first operation, a subsequent one will probably accomplish the reduction.

In about two months the plaster-of-Paris splint is removed and an extension apparatus applied. About four months after the operation the patient is allowed to get up and walk with crutches. At night the extension is reapplied. The limb is massaged twice daily, and once a day receives electrical treatment.

Danger of the Different Methods.—There is no danger in

¹ Revue d'Orthopédie, 1894, No. 3, p. 219.

² Revue d'Orthopédie, No. 2, 1894.

³ ANNALS OF SURGERY, 1888, VIII, p. 161.

the mechanical methods, of course, and none whatever in Paci's. Lannelongue's injections of chloride of zinc have thus far been harmless, but cause more or less pain, and in one case considerable fever for a few days.

I have notes on 177 cases of Hoffa's operation or some of its modifications, and among these are six deaths which may have been due directly to the operation. The mortality is therefore about 3.3 per cent.

Hoffa had two patients die a few hours after the operation, which in both cases was long and difficult. He ascribes these deaths to the narcosis, but he thought the hæmorrhage and shock also contributed.

His third death occurred twenty-four hours after the operation, and was probably due to iodoform intoxication, together with the shock and loss of blood. The girl was fourteen years old.

Kirmisson¹ had one case die from hæmorrhage and peritonitis eight days after the operation following perforation of the acetabulum. He used a gouge and mallet, which would appear to be more dangerous than curetting. His second death² also followed perforation of the acetabulum. The boy was seven years old, the operation long and difficult. He died of septicæmia, but the condition of the joint showed nothing.

Broca is reported to have had one death, but I cannot find the reference.

It would thus appear that Kirmisson's modification of Hoffa's method is a dangerous one, or his technique is defective.

Under strictly aseptic conditions it seems to me the operation should not be dangerous. On account of the irregular shape of the wounds, however, and the fact that the replaced head will act like a cork and retain any germs present, infection must be most carefully avoided. The position of the wounds also, especially in young children, will require great care to prevent the

¹ *Revue d'Orthopédie*, January, 1893.

² *Revue d'Orthopédie*, January, 1894.

dressings becoming soiled and the occurrence of secondary infection.

Hoffa¹ showed a case of bilateral dislocation operated upon over three years before. There had been no relapse. There was no lordosis, no waddling gait; the joints were sound, and showed very good motion. The child ran about all day without pain or fatigue.

He presented two other unilateral cases, which showed firm joints and good motion. One, a girl of eight years, operated upon three years ago, the other, two and a quarter years old, operated upon one year ago.

He said, "In all my other cases equally favorable results were obtained, after operations made in the manner recommended." Dr. Hoffa is an enthusiast, and states his case strongly, so I feel a little hesitancy in accepting such a broad statement without more details being given. The saving clause "after operations made in the manner recommended" *may* exclude some cases.

Lorenz, however, is also very enthusiastic in regard to his operation. He considers three to four years the most favorable age for operating, and does not like to operate after seven years. He thinks the distortions of the head and neck sometimes counterindicate the operation. These distortions can often be made out before operation.

He has now operated on sixty-three cases, and has recorded no death, and but three relapses, which were due to an anteverted neck. He often completes his operation in twenty minutes.

He reports² a very bad result from his first operation, in which he followed Hoffa's method, and which made him devise his own. Suppuration ensued, the knee also was affected, and finally there was a relapse of the deformity.

He reports this case among others: Girl eight years old. Operation, December 29, 1892. Fourteen months later absolute anatomical and functional cure. Not the slightest limp; runs, jumps, etc. Flexion from 180 degrees to 90 degrees. Abduc-

¹ *Verhandlung der deutsche Gesellschaft für Chirurgie*, Berlin, 1893, XXII, 12.

² *Centralblatt für Chirurgie*, 1892, No. 31.

tion, adduction, and rotation free; muscular power as good as that of the other side.

In Karewski's five cases¹ the femurs remained in place at first with free motion. In two of them the orthopædic apparatus was removed too soon, and they are beginning to relapse. One did well until he died of scarlatina. Two walk almost naturally now, eighteen and twenty-four months after the operation.

Karewski thinks cases of paralytic dislocation should give better results than the congenital dislocations, because the acetabulum is probably better formed in the former.

Schede² reports the results he has obtained in seven cases treated by Hoffa's operation. The patients were from four to twenty years of age. The shortening was greatly reduced in each case, and after the operation in no case exceeded two centimetres. The limp was in each case much improved, as was also the ability to walk about. One case suppurated, and in two a tendency to a recurrence of adduction and flexion had to be corrected by brisement.

Paci³ reports on fifteen cases, and they are almost perfect a year and more after operation. He says Redard, Nota, Regnoli, Motti, Rota, Ceci, Oliva, and Galbozzi have examined some of his cases, and were greatly pleased with the results he had obtained. On the other hand, Kirmisson reports seeing⁴ a case said to have been reduced in this way, but which was not. The head of the femur lying directly above, not in the acetabulum. The functional result, however, was very good.

I cannot myself understand how it is possible to *get* and *maintain* such good results as Paci reports, when we consider the pathological conditions present. And, theoretically, I cannot see how he can expect to get any better results than have been obtained by the method of gradual extension, immobilization, and protection, which has been so long and widely practised. He obtains his reduction at once, however, and this is a very great

¹ Centralblatt für Chirurgie, Leipzig, September 10, 1893.

² Personal communication, May, 1894.

³ Archivio di Ortopedia, Anno IX, No. 6, and *idem*, Anno X, No. 1.

⁴ Revue d'Orthopédie, May, 1894.

advantage, hardly to be over-estimated, and the traumatism inflicted may also help to secure the head of the bone in its new position by exciting an inflammatory exudate. The children he reports are from eight to sixteen years of age, and the results are most excellent a year and more after the operation.

It would thus seem that this is the method to be first tried at any age. If this does not succeed, we may try in addition injections of chloride of zinc, and later still, if the child is not over ten years old, Hoffa's operation, or Lorenz's modification of it, which seems to me preferable. If we have to do with an old, deformed, or painful case, Kirrison's subtrochanteric osteotomy may be done, or Hoffa's new operation, in which the head of the bone is sawed off at the intertrochanteric line, the posterior part of the capsule cut away to allow good apposition with the ilium, and the limb put up in abduction. Walking with a supporting apparatus can be begun then after about three months.

Redard's observations¹ agree with my own that after the bloody reposition—

The number of perfect cures is very small.

The number of cases improved is large.

The results in double dislocations are not so favorable as in single.

The lordosis is generally corrected.

A slight spinal curvature generally persists, owing to the atrophy of limb and pelvis.

The limp persists to some degree almost always, though, if the posterior dislocation is relieved, a high shoe will correct this limp almost if not quite perfectly.

When we consider that these cases will certainly become more and more deformed as they grow older, that about one-third of them will have repeated attacks of pain and disability, and that many cases are reported where the patients are rendered helpless by the flexion and adduction of their limbs, it seems to me we ought no longer to send them away without treatment. The mortality of Hoffa's operation is less than it is generally

¹ *Traité de Chirurgie orthopédique*, Paris, 1892, p. 534.

believed to be. The improvement in technique has made it much easier and more rapid, and the results are improving. And better still, Paci has made it possible by his rapid method to treat many cases who could not afford the time and attention demanded by the older methods.

In view, then, of these good results, and the even more promising character of the latest reports, we may undertake the treatment of these cases with the assurance that we can benefit them very materially in a comparatively short time.

REPORT OF SIX OPERATIONS ON THE SPINAL
CORD FOR THE RELIEF OF
PARAPLEGIA.¹

By JOHN A. WYETH, M.D.,

OF NEW YORK,

SURGEON TO MT. SINAI HOSPITAL; PROFESSOR OF SURGERY IN THE
NEW YORK POLYCLINIC.

TO this date, April, 1894, my experience in the surgery of the spinal cord embraces six cases,—one was for compression of the cord by a tumor, three were cases of fracture of the vertebræ, one gunshot wound, and one pachymeningitis hæmorrhagica externa. All the patients recovered from the operation.

CASE I.—S. S., nine years; admitted to Mt. Sinai Hospital, May 28, 1889. One week before admission he began to be paralyzed from about the level of the navel down, and in twenty-four hours the loss of motion was complete; control of the bladder was lost, while the rectum was unaffected; sensation was not disturbed; reflexes present; slight dorsal kyphosis, which had not been detected by parents. Three days later the reflexes disappeared. A Sayre jacket was applied, and he was put to bed with extension from head and both lower extremities for three and a half months.

September 18. Suprapubic cystotomy for severe purulent cystitis caused by frequent catheterization.

December 3, 1889. Operation. Longitudinal incision over spines from second to eighth dorsal; laminae of fourth, fifth, and sixth dorsal vertebræ removed. As the laminae of the fifth vertebra was removed with the rongeur the dura was seen to bulge out for an area of about three-fourths of an inch. On opening the dura a small mass of cheesy-looking material was seen, partly within and

¹ Read before the New York Surgical Society, April 24, 1894.

projecting from the right posterior and lateral aspects of the cord. It was in shape spherical, with a diameter of less than three-fourths of an inch. It was carefully lifted out with the handle of a scalpel, and the surface of the cavity left after removal was mopped out with a film of cotton in weak bichloride solution. The dura was carefully closed with catgut; remainder of wound packed with gauze; dry dressing over all. By February 1, one month after, urination was voluntary; no reappearance of motion. February 9, signs of motion in legs and feet. By April 20 he walked well, and now, after four years and four months, the functions of the parts once paralyzed are normal. He runs, jumps, dances, etc. There is a more pronounced kyphosis than at the time of operation.

CASE II.—H. A., male; twenty-one years; March 17, 1890, came to me by courtesy of Drs. Luckie and Copeland, of Alabama. On September 1, 1889, he had been thrown from the cow-catcher of a locomotive, striking the rail and bounding from the track. Was picked up unconscious, and when his senses returned it was found that he had lost all power of motion from the pelvis down, and that the bladder and rectum were paralyzed. There were severe pains in the legs and feet. On April 30, 1890, I removed the laminae of the last two dorsal and first lumbar vertebrae. The bodies of the two vertebrae were crushed in such a way that the cord was partly divided, and the undivided part was compressed between the lamina of the vertebra above and the crushed and displaced body below. Compressing bone removed and dura closed as in all cases. There was immediate slight improvement in motion, especially in the feet. This improvement continued, and now, 1894, he has good use of the lower extremities,—can flex and extend thighs and legs, and the anaesthesia has disappeared above the knees. This case is one of the most encouraging instances of improvement after injury in which several months elapsed before operative interference. He has, however, to use a cane or crutch in locomotion.

CASE III.—C. T., ten years; Georgia; fell from a tree in 1892 and fractured the spine in the dorsal region. Four months after the injury he was brought to me. There was complete paralysis of motion and sensation from the level of the umbilicus down; rectum and bladder paralyzed. When the bladder fills with urine, tapping on the abdomen just over this organ will induce a regular or seemingly normal act of urination until the bladder is well emptied. The removal of the laminae of the sixth, seventh, and eighth dorsal vertebrae

demonstrated a fracture with laceration of the cord, the continuity of which was almost completely destroyed. There was no improvement after the operation. Boy still living and in excellent health. His mind is unusually developed, especially in power of memory, in which direction he is precocious. He still causes the evacuation of the bladder by beating a tattoo over this organ.

CASE IV.—G. D., sixteen years, June 28, 1890, fell about twenty feet, striking on the back, and was picked up conscious, but totally paraplegic. Sayre jacket for six weeks. Rectum and bladder paralyzed.

February 18, 1891. Patient well nourished; no motion below hips; no sensation from junction of middle with upper third of thigh down; urine overflows. Referred to me by Drs. Gibney, Watson, and McLaughlin for operation.

February 26, 1891. Removed laminae of eleventh and twelfth dorsal and first lumbar vertebrae. As the dura was exposed there was evidently a pachymeningitis in the thickened dura. The cord was small and soft; there was no direct compression of the cord. Wound closed as usual. Patient removed without improvement, and died in April, 1894; cause of death not known.

CASE V.—J. C.; Mississippi; thirty-one years old; in April, 1893, in good health, was shot by robbers; six pistol-balls, 38-caliber, entered the body at short range, and five lodged. The first missile passed through the alveolus of the left upper maxilla, wounded the tongue, and lodged in the pterygo-maxillary fossa. This bullet I removed. The second ball fractured the right clavicle and was buried in the trapezius muscle, also removed. The third bullet struck the skull at the occipital protuberance and lodged in the muscle at the back of the head and neck. A fourth missile struck a rib and again left the body. A fifth lodged in the deep muscles of the back. At the sixth shot he fell, conscious, but paralyzed in the lower half of his body.

This ball entered the skin of the back two inches to the right of the spinous processes, and entered the spinal canal through the right laminae of the third and fourth dorsal vertebrae.

November 20, 1893, I saw this patient. There was complete muscular and sensory paralysis below a line starting near the sixth dorsal spine and passing parallel with the ribs to near the ensiform cartilage of the sternum. The bladder and rectum were also paralyzed.

November 22, 1893. During operation I tracked the bullet to spinal cord. It entered, cutting a plug of bone out of the right laminae of the third and fourth dorsal vertebrae. A rim of lead was found adherent to this hole of entrance. The bullet passed forward, cutting the dura on the right side and the right portion of the cord, and passed beyond search into the body of the vertebra just in front. Several spiculæ of bone were found in the cord, and these had destroyed that portion not divided by the missile. The patient recovered and is in good condition, but there is no improvement in his paralysis.

CASE VI.—S. L.; male, fourteen years, in good health, fell backward, in January, 1894, striking on his back across the projecting edge of a plank. After three hours of unconsciousness he realized that both lower extremities were paralyzed, both as to motion and sensation. Rectum and bladder also paralyzed. For several days after injury he had chills or rigors, and developed high temperature. He was treated by his physician by careful attention to the bladder and bowels, nutritious diet, and the prevention of bedsores to March 8, six weeks after the accident, when he came under my care, and I had him removed to Mt. Sinai Hospital for operation.

He was seen here by Dr. Sachs in consultation, and it was found that there was complete loss of motion and sensation below the level of the ninth dorsal vertebra behind, to near the umbilicus in front. The variations of temperature in this case present an interesting study.

March 8. 6 A.M., 99.6°; 9 P.M., 103.7° F.

March 9. 6 A.M., 104.4°; 8 A.M., 102.5°; 11 P.M., 104.3°; 12 noon, 103.5°; 3 P.M., 104.7°; 6 P.M., 102.2°; 9 P.M., 103.5° F.

From 9 P.M., of March 9, it steadily declined, and at 6 A.M., March 10, it fell to 97°. By 3 P.M. of March 10 it was 103.5°; March 11, 12, and 13, there was little change from 101° to 103°; March 14 it fell, at 9 A.M., to 99.4°; 15 and 16, about 99° to 100°; 17, at 9 A.M., 101° to 102°, a chill came on, and temperature rose rapidly to 104°; 18 and 19, about 100°; 20, chill, 103.4°; 21, chill, 105°; 22, 102° to 104°; 23, 100° to 101°, operation; 24, 102°; 25, 100° to 104°; 26, 101° to 105.8°; 27, 101° to 105.8°; 28, 100° to 104.8°; 29, 101.5° to 103.3°; 30, 102°; 31, 97° to 102.2°; April 1, 101° to 105.2°; 2, 102°, and fell to 100°; 3, 101°, at 3 P.M. it fell to 98°, and by 5 P.M. 103°; 6, chill 3 A.M., 103.4°; 7, 99°; 8, 105°; 9, 101°; 10, 103°; 11, 101° to 103.8°; 12, 99° to 100°; 13, 100° to

101°; 14, 6 A.M., chill, 102°, by 3 P.M. 99°; 15, 103.5°, chill; 16, 9 A.M., 99°; 6 P.M., 105.2°; 17, 6 A.M., 103.3°; at noon he died, 102° F.

On March 23, I removed the laminæ of the ninth, tenth, and eleventh, and part of the eighth dorsal vertebræ. Between the dura and the bones was a layer of lymph about one-eighth inch in thickness, which could be lifted off by careful scraping with the dull scissors. This extended upward and downward as far as the canal was exposed. This membrane was like the rich plastic lymph which covers the intestinal peritoneum in some forms of appendicitis. The dura was incised for four inches, and a free quantity of cerebro-spinal fluid escaped. The cord was not bruised or divided, but seemed generally smaller than normal. The patient rallied well from the operation. The variations in pulse and temperature, which were present for three weeks before the operation, persisted to the end. The urine for some weeks before operation, and after this, was ammoniacal in odor, and contained pus, necessitating irrigation every six to ten hours with warm Thiersch's solution. He gradually and steadily declined from the day of injury to April 17, the date of death. The wound healed without suppuration. The cerebro-spinal fluid escaped from the wound in varying quantity to about six days before death, when the last drainage opening was closed. An autopsy was refused, much to my regret.

The technique I prefer is a free incision just over the spines, division of the attachments close to the bones with dull scissors or the elevator, strong retraction, and iodoform-gauze packing to contract and arrest bleeding. When well exposed, the laminæ are gnawed away in bits first by the round rongeur, and when an opening is effected by the more rapid cutting fenestrated rongeur. When exposed in full length of the injured region, and all bleeding stopped, the dura is carefully punctured with the scalpel, and as the first few drops of cerebro-spinal fluid escape, the grooved director is inserted, the dura split open in the middle line. This membrane should be closed by a careful continuous catgut suture. The muscles are sutured by subcutaneous catgut sutures, and the skin incision closed by silkworm, leaving a wick of iodoform gauze running from the dura out of the lower angle of the wound for drainage. Dry dressing over all. Each of my cases

healed without suppuration. The outflow of cerebro-spinal fluid continued from two to four days in all but the last case, in which it leaked out for several weeks.

From my experience, I would conclude,—

(1) The operation offers no great difficulty or danger.

(2) Paraplegia justifies exploration, and this should be done early in all cases where no improvement is marked. The degenerative changes, which occur from compression which has not divided the cord, add to the urgency of early interference.

TUBERCULOSIS OF THE BREAST.¹

BY CHARLES A. POWERS, M.D.,

OF NEW YORK,

SURGEON TO ST. LUKE'S HOSPITAL AND TO THE NEW YORK CANCER
HOSPITAL.

A CAREFUL search of the medical literature of our own country reveals but one authentic instance² of the affection to which I invite your attention, and the paucity of other references to the subject, the small number of recorded cases, lead me to think it worthy of consideration by this Society.

My own interest was excited by the observation of the following case which I saw, some years ago, in the wards of Dr. W. T. Bull, at the New York Hospital.

CASE I.—M. B., twenty-six years, a native of Ireland, married, was admitted to the hospital, October 6, 1886. Her family history was devoid of interest. She had given birth to one child, two and a half years previously, nursing it with the right breast only. She had always been of spare frame, but had enjoyed good general health, and had not, of late, lost flesh or strength.

Three weeks before being seen, the left breast became the seat of sharp pains and soon afterwards began to swell. On examination this breast was found to be slightly enlarged, and just below the nipple, which was retracted, a hard, nodular swelling the size of the fist.

This tumor was freely movable on the deeper tissues, the skin over it was red and adherent over an area the size of a silver dollar, at which point fluctuation was detected. Enlarged veins covered the breast and there was a swollen gland to be felt in the axilla.

The right breast seemed normal. Operation October 7, 1886, by Dr. Bull. An exploratory incision detected a little pus and a

¹ Read before the New York Surgical Society, May 23, 1894.

² Ely, Transactions of the New York Pathological Society, 1890, p. 81.

grayish-looking, nodular mass, somewhat resembling carcinoma. Excision of the gland and of the axillary contents in the usual manner. Catgut drain in the axilla; primary union except at the site of the drain.

Histological report by Dr. F. Ferguson. "The tumor of the breast is made up largely of tuberculous tissue, surrounded by inflammatory areas and by connective tissue. The tubercular areas are chiefly located in the glandular acini, but they are occasionally found, as well, in the excretory ducts. Occasional vessels are found whose calibre is markedly encroached upon by growth from the intima."

I saw this patient in January, 1890, three years after the operation. The scar was soft and free from any evidence of recurrence either in the chest or axilla. No enlarged glands were to be felt above or below the clavicle.

The patient was emaciated, weak, and anæmic. She had constant cough and expectoration. There were evidences of consolidation at both apices.

I sought her again one year later, but the people in the neighborhood said that she had died of pulmonary consumption.

When we turn to literature for references to companion cases of this affection, we find authentic records of but few instances. Thus, after a thorough search of the accessible literature, in which task I have had the valuable aid of Dr. George R. White, I find but thirty-four cases¹ in which the presence of tuberculosis of the breast was found by histological examination. Numerous additional cases have been reported, in which the diagnosis rests on clinical grounds alone. That such may very well be subject to error, however, is shown by the following illustrative case, which is also taken from the case-books of Dr. Bull:

CASE II.—Mrs. G., forty years; widow. The family history was negative. She had borne one child. This she had nursed, but had had no inflammation or other trouble with either breast until three weeks previously, at which time she had strained the right arm while lifting. Shortly afterwards she had noticed a small lump above the

¹ Reported by Mandry, Dubar, Duret, Olnacker, Poivier, Orthmann, Kramer, Piskacek, Héring, Roux, Berchtold, Hebb, Dubrueil, Shattock, Bender, Campénon, Lane, and Ely.

right nipple. This lump became enlarged and tender. The following week the entire gland was enlarged. Examination revealed a diffuse mass occupying the entire right breast, which was irregular, firm, and tender. Lumps were felt in the axilla. Operation March 20, 1891. Excision of the breast and axillary contents. No drainage. Primary union.

On section, the cut surface of the breast appeared of a grayish-white color, with numerous suppurative foci. A provisional diagnosis of tuberculosis was made, but careful microscopic examination at the hands of Dr. Ferguson and myself revealed no evidence of other lesion than that of chronic inflammatory mastitis.

Eliminating, then, the cases not subjected to microscopical examination, we find 35 instances¹ of tuberculosis of the breast.

Of these 34 were in females, one in a male. Of the 34 women 22 were married, 5 single; in 8 the civil condition was not mentioned; 21 of the 22 married women had borne children, and 6 had suffered with a suppurative inflammation of the breast, while 3 others had had an inflammation not going on to suppuration.

In 18 the right breast was affected, in 14 the left, both glands in 1, while in 2 the side was not stated.

As regards age, the youngest patient was 17 years, the oldest 52, 4 were under 20, 11 between 21 and 30, 9 between 31 and 40, 10 between 41 and 50, 1 over 50.

From this we may assume, as indeed we might expect, that the puerperal state and subsequent lactation are not without predisposing influence. The appearance of the disease is, however, evenly distributed throughout the third, fourth, and fifth decades of life.

As to the relative frequency, we can form no approximate estimate from the scanty data at our disposal.

Of contributory interest is the fact that of 185 primary operations for breast neoplasms, conditions other than mastitis, occurring in the practice of a single surgeon, Dr. Bull, but one instance of tuberculosis is found, all of the cases having been subjected to histological examination.

¹ The aid rendered by the valuable paper of Mandry is herewith acknowledged.

*Pathology.*¹—The tuberculous breast may be larger or smaller than normal. It may appear normal to the eye, or it may be the seat of fistulæ. There may be a single, large, fluctuating swelling, or several small ones. The skin over these may seem normal, or it may be thinned and discolored.

There may or may not be glandular nodules leading to it found in the axilla. There may be axillary fistulæ. At times there are one or more hardened nodular masses felt in the breast-substance.

The fistulæ, if they be present, have thin, undermined, discolored edges, and secrete a thin caseous pus, in which the tubercle bacilli may be found.

On cut section the breast may show one or many nodules of irregular size, broken down in the centre, the cavity lined by an irregular, thickened, soft, grayish, shreddy membrane.

These cavities have outrunning branches, and the larger generally communicate. The surrounding tissue may be the seat of disseminated tubercles of varying sizes.

In some instances the entire breast is the seat of a circumscribed abscess, filled with thin, caseous pus.

The glands leading to the axilla and those therein may be normal, but are more often hyperplastic or tuberculous. Exceptionally the axilla may be the seat of a tuberculous abscess.

Microscopically the affected tissue does not differ from that found in other organs. Giant cells containing the bacilli are found in the breast. The bacilli are in greater abundance, however, in the affected lymphatics.

Symptoms and Course.—This may be surmised from the foregoing. At times the attention of the patient is attracted by the discovery of a lump in the breast, at times by a feeling of distention, more often, perhaps, by pain.

The lumps increase in size slowly, they may remain stationary for a considerable period. The skin may become thin, discolored, break, and the cavity discharge a thin, caseous pus. The fistulæ do not tend to heal, thus differing from those of non-

¹ Mandry, loc. cit.

tuberculous mastitis. Axillary evidences may occur early or late.

Diagnosis.—This can be made with certainty only from the microscopic investigation.

In certain cases well progressed the clinical diagnosis will be a probably correct one. So, in a woman of spare form, "tuberculous" appearance, with a history of glandular or joint tuberculosis in youth, or with coexistent lung infection, the presence of a suppurative breast affection of considerable duration with fistulous tracts and axillary involvement, will lead one to the thought of tuberculosis. In the earlier stages diagnosis will be very difficult. A subacute or chronic mastitis may simulate it very closely, so, as well, beginning carcinoma, fibroma, or adenoma, less probably would a cyst or sarcoma occasion error.

Treatment.—Since the recorded cases show that in the majority of instances a considerable portion of the breast tissue is infiltrated with tuberculous foci, and that the axillary glands are also involved,¹ we readily conclude that radical treatment calls for the removal of the breast and the axillary contents.

Simple opening of abscesses with scraping of the walls and of fistulæ may in exceptional instances lead to permanent cure. Recurrence will, however, generally take place. As in carcinoma, we are to explore the axilla, even though nothing be felt on palpation.

Prognosis.—Of the thirty-five collected cases, two, those of Orthmann and Héring, died of general tuberculosis, the breast affection being discovered only at the autopsy.

Of the remaining thirty-three but two cases were followed after operation, these dying of phthisis in one and four years respectively.

In general we may assume that local recurrence should not take place after thorough removal, in cases in which the axillary glands are slightly or moderately involved.

When, however, these are extensively invaded, it is probable that the process affects as well inaccessible glands. The ten-

¹ Twenty-four cases out of the thirty-five.

dency to implication of the lungs is, perhaps, greater than in the tuberculous affections of more distant parts.

Summary.—The relative frequency of tuberculosis of the breast cannot be approximately estimated from present data. It may in general be considered of infrequent occurrence.

Diagnosis must rest upon microscopic examination.

Adequate treatment calls for the removal of the gland and the axillary contents.

The prognosis as regards local recurrence is good.

Where possible, local operative treatment should be supplemented by placing the patients under climatic and other conditions suited to the prevention and cure of tuberculosis in general.

BIBLIOGRAPHY.

- Mandry*: Beiträge zur klin. Chir., Bd. 8, p. 179.
Habermann: Beiträge zur klin. Chir., Bd. 2, p. 53.
Dubar: Des tubercules de la mamelle, Thèse, Paris, 1881.
Duret: Le Progrès Médical, 1882.
Olnacker: Archiv für klin. Chir., Bd. 28, p. 366.
Poirier: Archives générales de Médecine, 1882.
Orthmann: Virchow's Archiv, Bd. 100.
Kramer: Ref. in Centralb. für Chir., 1888, p. 867.
Piskacek: Wiener Med. Jahrbücher, 1887.
Héring: Die Tuberk. der Mamma, E. Congress, 1889 (Mandry).
Roux: De la Tuberc. mammaire, Genève, 1891.
Berchtold: Ueber Mamma tuberculose, October, 1890 (Mandry).
Hebb: Trans. Lond. Path. Soc., 1888.
Dubrueil: Gazette Médicale, 1888; also Gazette hebdomadaire des Sciences médicales de Montpellier, 1890.
Shattock: Lancet, 1889.
Bender: Beiträge zur klin. Chir., Bd. 8, p. 205.
Campénon: La Semaine médicale, 1888, p. 413.
Lane: British Medical Journal, 1890, II, p. 630.
Ely: Trans. N. Y. Path. Soc., 1890, p. 81.

VENOUS TUMOR OF THE DIPLOË.

By LEWIS S. PILCHER, M.D.,

OF BROOKLYN,

SURGEON TO THE METHODIST EPISCOPAL HOSPITAL.

THE case which I wish to report differs from the class of venous tumors of the cranial vault so very fully treated of by Dr. W. M. Mastin,¹ in 1885, in that the tumor did not communicate directly with the longitudinal sinus, but was essentially a huge venous cavern, into which numerous diploic veins of ordinary size opened. In this respect the tumor was so peculiar that I have ventured to report it here.

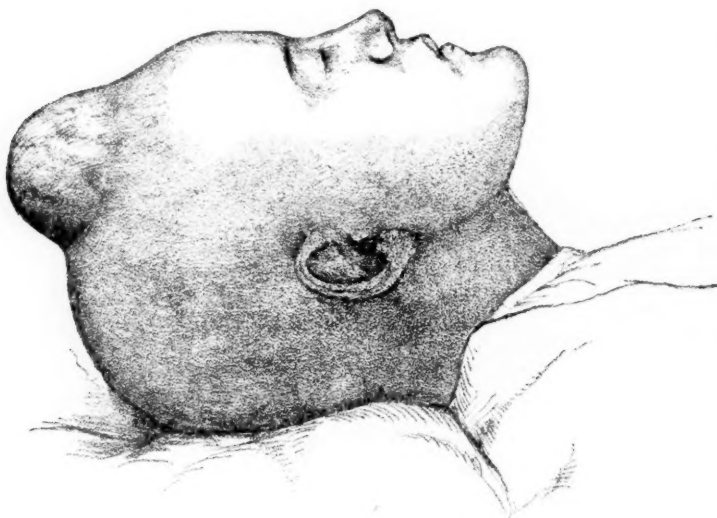
The patient was a girl, fifteen years of age, well-developed and healthy. When she was five years of age she fell and struck violently upon the top of her head. Within a few days thereafter a small soft swelling was noticed at the site of the injury. No pain or tenderness or inconvenience attended this swelling, but instead of subsiding, it gradually increased in size. At the end of five years it was lanced, and a small quantity of clotted blood was evacuated. It immediately refilled. In the course of a year it was again repeatedly lanced, but with a like result. After this nothing was done, and the tumor continued to slowly increase in size until she presented herself at the Methodist Episcopal Hospital in Brooklyn, in March, 1894.

At that time she presented a prominent tumor lying over the site of the anterior fontanelle. Its longest diameter, which was about two and a half inches, was from before backward. The greater part of its convexity was covered by very thin skin without hair, to which the contents of the tumor gave a blue livid color. About its base the skin gradually assumed the usual characteristics of the scalp. Along the right anterior quadrant of this base an elevated plate of bone could be felt.

¹ ANNALS OF SURGERY, Vol. I, pp. 324 and 439.

The tumor was soft and fluctuant. It could be diminished very slightly in size by compression. The head being bent over, the tumor became more tense. It was gradually enlarging, and from the evident thinning of its skin-covering must soon burst.

March 14, I operated for the relief of this condition, laying the tumor open antero-posteriorly by a free incision. The somewhat free bleeding which followed the incision was controlled by finger and tampon pressure. The contents of the tumor consisted in small part of blood-clot and in great part of fluid blood. As it became possible to inspect the base of the tumor, it appeared that anteriorly and to



Venous Blood-tumor of the Diploë.

the left the entire thickness of the cranial bone was wanting, and over an oval space of about $2\frac{1}{2}$ by $1\frac{1}{2}$ centimetres diameter the dura mater was exposed; to the right of this the internal plate of the cranial bone alone was intact for some distance, and at the periphery of this defect in the bone the expanded spongy diploic layer could be seen, surmounted by an overhanging ledge formed of the external plate. Certain venous channels of this diploë layer were open, and from them a free bleeding took place when pressure was intermitted. Posteriorly the expansion of the diploë gradually ceased, and the intact cranial wall entered into the base of the tumor, except that there was some superficial erosion of the outer table from the pressure of the tumor.

The overhanging bone ledge was gnawed away with a rongeur, the entire base of the cavity was well curetted; the thinned skin covering was cut away; the whole raw surface was firmly tamponned with iodoform gauze, and as far as possible, perhaps over one-third of the involved area, the wound was sutured. A firmly applied bandage over the tampon sufficed to prevent bleeding. No complication disturbed the after-course of the case. As soon as the process of granulation had become well established, a slight plastic operation, sliding flaps from the adjacent scalp, sufficed to cover with sound tissue the entire area formerly occupied by the tumor.

There is no reason to suppose that any tumor existed before the date of the blow described, and the history of the blow and the subsequent gradual development of the tumor is positive. It would seem that the case was one originating in a simple, slight, traumatic hæmatoma, the effusion taking place beneath the pericranium at the point of union of the coronal and sagittal sutures. The finally developed tumor was not a dilatation of any vessel, had no intima, was, in fact, a large adventitious blood-space, through which a circulation was maintained by the multiple diploic-venous channels which opened into it. To the fact that the walls of these channels could not collapse is probably due the development of the condition originally. Doubtless in its earlier years suitable compression would have sufficed to obliterate it. At the time it presented itself to my own notice a more vigorous surgical attack was plainly indicated.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, April 11, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

NEPHRECTOMY SUPPLEMENTING NEPHRO-LITHOTOMY.

DR. CHARLES K. BRIDGON presented a patient, a man, forty-nine years of age, who, from the age of five years, had been the subject of attacks which consisted of excruciating pain referred to the region of the left kidney behind. The pain would begin slowly but would gradually increase in severity until the acme was reached in about ten hours. Then of a sudden the pain would leave him, his bladder would instantly fill up, and he would pass sixteen to eighteen ounces of urine. The relief was almost instantaneous, for in a very few minutes he would feel perfectly well and attend to any duty or engage in any sort of sport. Attacks precisely similar to these in character occurred throughout the patient's life at varying intervals in spite of various methods of treatment. The intervals between the attacks would at times be of several months, at times only of a few weeks, there being no regularity whatever in their occurrence. Between the attacks the patient was always entirely free from pain. He thinks he remembers to have had some blood in his urine once or twice, but is not certain. At the age of forty-five he sought operative treatment. This was four years ago, and a lumbar nephrotomy was then performed upon him in one of the city hospitals. The kidney sac was cut into and its contents evacuated, but no stone was found.

Five weeks after the operation the old pain returned precisely similar in character to that previously suffered. These attacks he has had about every two weeks since then. The wound healed up, but the patient experiences no appreciable benefit from the operation. During these attacks the pain was partially controlled by large doses of morphine. The patient was rather loth to undergo any further

operative procedure, but after a period of six months' trouble this last summer and fall, in which the attacks were frequent and severe, he finally consented to an exploratory operation, by Dr. Briddon, the object of which was to ascertain the condition of the disturbing kidney, with the understanding that it should be removed, should it prove to be diseased or useless.

During his stay in the hospital previous to operation his urine varied in specific gravity from 1015-1024, contained albumen varying from three to twenty per cent., almost constantly some pus,—a few blood-cells being also found once,—in other respects negative.

On January 3, 1894, the kidney was exposed by a vertical lumbar incision. It was surrounded on all sides by dense adhesions,—posteriorly especially they were extremely firm. Sweeping over the anterior surface of the kidney the finger broke through the remaining thin shell of kidney-tissue into a large pus-cavity. In fact, the kidney, as it was, was only a large pus-sac surrounded by a delicate wall of renal tissue. The pus was evacuated. The finger then came into contact with a calculus which, with some other loose fragments, was removed. The remaining mass of renal tissue being useless as a kidney it was decided to remove it. For this a second incision was made, running at right angles to the first from about its middle, allowing more room for manipulation.

The kidney-tissue was then removed piecemeal, a small quantity being left behind, however, to serve as part of the pedicle to be tied off. This was done with heavy silk.

The edges of the gaping wound were approximated somewhat with a few silkworm-gut sutures, the wound itself being packed to its bottom with iodoform gauze. Projecting from the wound were the ligatures around the pedicle, left long purposely. An aseptic dressing was applied and the patient returned to the ward.

Considerable shock attended this operation.

For the first three days following the operation he passed urine to the amounts respectively of sixteen to twenty-six and thirty-nine ounces, the urine containing some albumen, pus, and blood. His thirst was relieved by enemata of water at first, the pain controlled by morphine, and his general condition sustained by liberal stimulation. On the fourth day the wound was dressed, being irrigated with peroxide of hydrogen and 1-5000 corrosive sublimate solution, then repacked lightly with iodoform gauze. The patient complained of more or less pain, but not the same pain as experienced before the operation.

After this the wound was regularly dressed every second day, the healing process progressing favorably. The small bit of tissue, however, between the two horizontal incisions of this operation, and the oblique cicatrix of the previous operation four years ago, did not retain its vitality, its blood-supply being inadequate. The ligatures surrounding the pedicle were slow to cut through. It was not until six weeks after the operation that the first loop came away, the others being removed four days later. After this date his recovery was uneventful. The calculus was composed of urates; it appeared to be formed by the fusion of four distinct masses, measuring three and three-quarters inches in circumference and weighing 100 grains.

NEPHRECTOMY FOR URINARY FISTULA FOLLOWING NEPHROTOMY FOR PYONEPHROSIS.

DR. BRIDDON presented a second patient, a woman, twenty-nine years of age, who had been admitted into the Presbyterian Hospital, September 10, 1893, with pronounced symptoms of pyonephrosis of three months' duration. In her right lumbar region a mass could be made out the size of one's two fists, not connected with the liver above, and tender. A lumbar nephrotomy was done and a pus-sac emptied. Considerable healthy kidney-tissue was found; the kidney was therefore left.

Following this operation the parts all healed with the exception of a small fistulous tract leading into the kidney. Through this a considerable amount of urine was passed daily, the daily amount by the urethra varying from twenty to thirty ounces. She still complained of some pain in the region of the right kidney. As the fistulous tract persisted, in spite of efforts to close it, the removal of the kidney was done, five months after the first operation. The lumbar incision was employed along the outer border of erector spinæ muscle just to the inner side of the fistulous opening. When the kidney was reached its motion up and down with respiration could be plainly seen, amounting to one-half to three-fourths of an inch in extent. Endeavor was made to free the kidney from its surrounding structures without breaking through the capsule. This was found in places to be a difficult matter on account of the adhesions. To allow of more room, a second incision at right angles to the first was made, running anteriorly for about four inches. A silk "loop" was then passed through the kidney-substance, allowing the kidney itself to be brought farther up into the wound for manipulation. The

kidney was finally freed behind. In front its peritoneal investment was also pushed back and the kidney itself brought thoroughly into the wound. Its pedicle, consisting of vessels, ureter, etc., was then tied off with silk, cut, and the kidney removed. The fistulous tract was also removed.

During the operation a part of the posterior surface of the kidney was broken into and some pus came out, which was immediately sponged away. When the pedicle was cut, and, in fact, during the whole operation, the oozing was only slight and easily controlled.

The wound was packed with iodoform gauze, the ligatures around the pedicle being left long and protruding from the wound in the dressings. The patient recovered well from the operation.

For the first week following the operation the daily amounts of urine passed were respectively,—25½ ounces, 1023; 31½ ounces, 1034, the urine containing only a trace of albumen and some few pus-cells; 35 ounces; 23 ounces; 28 ounces, 1025; 32 ounces; and 34 ounces.

The wound was dressed at intervals, being allowed to heal up from the bottom. The pedicle ligatures came away on the fortieth day. By the end of ten days from the operation the urine had run up to forty ounces daily, and has since maintained itself about these figures. The pus disappearing in a few weeks entirely.

The pathologist's report on the kidney removed was that some of the calyces were distended, the walls rough, and the surrounding tissue inflamed and soft. There were a few small yellow nodules resembling tubercles. On microscopic examination the diagnosis of tubercular inflammation was confirmed. When the patient was presented, two months after operation, the wound was almost closed and the patient felt perfectly comfortable. She was passing from forty to fifty ounces of normal urine daily.

COCCYGEAL DERMOID CYST UNDERGOING EPITHELIO- MATOUS DEGENERATION.

DR. BRIDDON also presented a man, fifty-two years of age, who, thirty years ago, first noticed a swelling over the coccyx, which, after gradually increasing in size for some time, appeared to ooze out a watery discharge and become smaller; it was never painful, and the occasional increase and diminution in size continued until some months ago, when it became sensitive, prevented him getting about or assuming the sitting posture.

When admitted to the Presbyterian Hospital, immediately over the coccygeal region was an ovoid fluctuant tumor, measuring in its vertical diameter four inches; transverse, two. Skin covering it slightly reddened, while the upper portion contained some very hard masses.

Under ether, the tumor was dissected out from its surroundings. The superficial portion of the cyst-wall was thin and closely related to the skin. The deeper portion, non-adherent, was very much thicker. At the tip of the coccyx a thin-walled process, about one inch and a half in diameter, passed into the pelvic cavity, but was easily shelled out. The integuments were approximated by sutures of silkworm gut, but union *per primam* failed, and the wound is not yet entirely healed.

The cyst was about the size of a goose's egg, an incision giving exit to a few ounces of blood-stained fluid. The superficial walls were thin, the deeper ones in some places three-quarters of an inch thick, and irregularly eroded.

DR. THACHER, the pathologist, reports that the cyst showed connective tissue, containing epitheliomatous alveoli, and that it was probably a dermoid cyst, whose lining had become epitheliomatous.

DR. J. A. WYETH remarked that a man with a dermoid cyst of the coccyx came under his care ten years ago. He was thirty-five years of age. The cyst had never given him any trouble; was supposed to be a fistula, and for which Dr. Wyeth was requested to operate. Instead of a fistula he found a dermoid cyst, which contained a tuft of hair. A case of epithelioma in the same region was sent him subsequently by Dr. Andrew Robinson, and he was of the impression that it had probably resulted from a dermoid cyst of the coccyx, although proof of this was lacking. He excised it freely, but there was recurrence, and he sent the woman back to Dr. Robinson, who used Marsden's paste, and effected a cure. Since this time Dr. Wyeth had used Marsden's paste many times, and would recommend it in Dr. Briddon's case. He used two parts arsenious acid, one of powdered acacia, and added enough cocaine to deaden sensibility. Pain was not complained of.

DR. R. ABBE thought coccygeal cysts were almost always dermoid. He had had three cases during the past five years. He saw no reason why they might not become epitheliomatous, as sometimes occurred in sebaceous cysts of the scalp.

Experience had taught him that it was not best to make a vertical incision along the groove in excising coccygeal cysts, but to cross into the soft fatty tissues and draw to one side. Primary healing would then take place.

DR. W. MEYER had seen a number of cases of cyst of the coccyx, and had been impressed by the readiness with which they took on inflammation. In a large one the presence of faecal odor led to the supposition that it was a faecal fistula, but it was found to be only a dermoid cyst which had undergone suppuration. In another case, owing to the hard borders and painful condition, the diagnosis of carbuncle had been erroneously made. When inflammation existed, he packed the wound left after excision with gauze, removed it after three or four days, stitched the edges together, after which there was prompt union.

SIMULTANEOUS LIGATION OF INTERNAL ILIAC ARTERIES FOR HYPERTROPHY OF PROSTATE.

DR. WILLY MEYER presented a patient on whom he had performed Bier's operation for the relief of symptoms attending hypertrophy of the prostate, accompanying the presentation with remarks upon the method. (See page 44.)

DR. WYETH said that while one could but admire the operator's boldness and skill, it seemed to him the operation was rather a formidable one, and the benefit to be derived from it was not commensurate with the danger incurred. Moreover, there was another simple and successful method of relieving the damming in of urine caused by the prostatic enlargement and urethral closure. He referred to suprapubic drainage, a method the success of which had been enhanced by the apparatus devised by Dr. Meyer himself. If continuous suprapubic catheterization were resorted to in the case presented to-night, there would be no necessity for drawing off residual urine, which is now necessary even after so dangerous an operation as he had been subjected to.

DR. BRIDDON acquiesced in the remarks of Dr. Wyeth, for while he felt indebted to Dr. Meyer for bringing the operation to the notice of American surgeons, and admired the boldness displayed in the case presented, yet he would not care to take the risks for the results promised, especially when relief could be obtained with certainty by other means.

DR. KAMMERER thought that suprapubic drainage, to which allu-

sion had been made, had drawbacks. He had been unable to prevent leakage by such apparatus as had thus far been devised. He had even had a plaster mould made of the section of the abdomen and a pad fitted to that, yet after a time the patient would again be troubled by leakage.

DR. ABBE remarked that, according to reports which he had read, the method of Dr. Hunter McGuire had been most successful in preventing leakage in suprapubic drainage. It consisted in conducting the catheter through an oblique channel made by the knife in the walls of the abdomen and allowed to cicatrize.

DR. BRIDDON had performed Dr. McGuire's operation in two cases strictly according to the directions given by the inventor, yet it had not prevented leakage. In his judgment dilatation must necessarily take place in the channel around the tube from pressure, and soon lead to leakage.

DR. MEYER rejoined, saying that suprapubic drainage was only symptomatic treatment, and although he believed leakage could be prevented by the apparatus devised by himself and successfully modified by Dr. Bangs, yet he thought if there was radical cure for the trouble the patient should have the benefit of it. He did not think the operation a very dangerous one, especially if one could simply tie the internal iliacs without cutting the sheath, as he expected to do hereafter.

Replying to an interrogatory by Dr. Wyeth, whether tying the internal iliacs caused atrophy of the bladder by shutting off its circulation, Dr. Meyer said that no such atrophy had occurred in his case or those of Bier's, a fact to be accounted for by the collateral circulation. Regarding artero-sclerosis as a cause of prostatic hypertrophy, none existed in the man presented nor in the patients operated upon by Bier.

Referring to a remark by Dr. Wyeth, he said that his patient did not now have to use the catheter any more, although there was still considerable residual urine.

PAPILLOMA OF THE BLADDER COMBINED WITH STONE.

DR. MEYER presented some specimens, the first being a papillomatous tumor of the bladder of about an apple's size, removed recently by suprapubic cystotomy from a man who had had hæmaturia about twice a year during the past eight years. The sound introduced into the bladder came in contact with a stone. The presence

of the papillomatous tumor was revealed by the cystoscope, its situation being on the left side sufficiently high not to obscure the view of the mouth of the ureter. It was removed on the 27th of December, 1893. The patient made a good recovery. The speaker again emphasized his preference for the transverse incision through the abdominal walls. It was immaterial in which direction the bladder was cut, except that the transverse incision was much easier to close by suture than the longitudinal. In this case he had shelled out the tumor's pedicle with the Paquelin cautery which naturally resulted in traumatic ulcer. The bladder having been sutured, this ulcer produced great spasm, especially when the permanent catheter was removed from the urethra on the fourth day. In his next case of tumor of the bladder, where the insertion of the tumor could not be cut out with the knife within healthy tissue, and the resulting wound in the vesical wall closed by stitches, he would again introduce a suprapubic drain as he had done before, instead of entirely closing the vesical opening.

ENCYSTED VESICAL CALCULUS.

DR. MEYER presented a large vesical calculus obtained in a case which had offered some difficulty in diagnosis. He first saw the patient, a man of seventy-two years, in the fall of 1892, when he was suffering from retention of urine believed to be due to hypertrophy of the prostate. A colleague had tried to introduce a catheter, but had failed. Dr. Meyer found little difficulty in introducing the so-called prostatic catheter-sound of Trendelenburg, and on careful search with that steel instrument found nothing within the bladder. The patient passed from under observation a year, when Dr. Meyer was again called in for retention. The same instrument was used to relieve the patient, but failed to strike anything in the bladder which would lead him to think there was a stone. The patient, who had been a slave of the catheter for three years, was now ordered by his doctor to remain under Dr. Meyer's care. At one of his visits he had complete retention of urine; for the third time Dr. Meyer tried for an hour to enter the bladder, and finally succeeded in Trendelenburg's posture. He decided to make a suprapubic oblique canal, according to Witzel's method for gastrostomy, but before doing so wished to exclude a tumor or calculus, and found himself able to readily pass the irrigating cystoscope in the Trendelenburg posture. He then saw on the "anterior" wall of the bladder a large stone. Being unable

to bring the cystoscope forward, in order to touch the stone, he left it in position and shook the suprapubic region of the abdominal wall, and succeeded in dislodging a large-sized stone out of a position just above the symphysis. On January 30, 1894, it was removed through a suprapubic opening. The wound in the bladder was closed by catgut sutures down to its lower angle, which was left open. Through it a soft rubber catheter was introduced for about two inches. The projecting (outer) portion was then turned down upon the bladder and buried in its wall by stitching over it two folds of the latter, one being taken from each side (infolding). The wound was packed with sterilized gauze. Permanent drainage was applied. Everything went nicely during the first two days. There was no leakage whatever. On the third day the patient had a sudden unexpected stool and pressed the catheter end out of the bladder, no special stitch having been put in in order to fasten it. With some difficulty it was reintroduced in Trendelenburg's posture. Two days later the same accident occurred. The catheter was again introduced. This repeated manipulation spoiled the result for some time. Patient is now cured with a tightly-closing wound around the catheter. He wears a urinal. What had been called McGuire's operation to-night, seemed to be the formation of an oblique canal through the wall of the stomach or bladder. This was originally proposed by Witzel, of Bonn, in 1891.

SARCOMA OF THE KIDNEY.

DR. ABBE presented a kidney which had undergone sarcomatous degeneration. It weighed about a pound and a half, and had been removed the day before from a child three years and a half old. Trendelenburg's posture: long cross incision: minimum loss of blood. The child was doing well.

Stated Meeting, April 24, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

PYLOROPLASTY FOR ULCER OF THE STOMACH.

DR. B. F. CURTIS presented a colored man, sailor, aged thirty-seven, on whom a month before he had performed pyloroplasty for syphilitic (?) stricture of the pylorus. In April, 1893, the man had

begun to suffer from pain in the stomach after eating. The next month he began to vomit food, mucus, and a "coffee-ground" substance, which he thought was food. In a state of marked emaciation, and being quite unable to work, the patient entered the New York Cancer Hospital in March, 1894. He admitted gonorrhœa, venereal ulcers, and alcoholism. The vomiting occurred at quite regular intervals, once a day, after every third or fourth meal, without nausea, and the amount of mucus was small.

Pain was relieved after vomiting, but no improvement took place under washing out the stomach; there was great reduction in hydrochloric acid in the stomach contents. The diagnosis of pyloric obstruction was made, probably benign in character. Dr. Curtis performed laparotomy by a median incision which was joined by a transverse incision at right angles. An exploratory incision was made in the stomach, and an ulcer was found encircling the pylorus, with abrupt edges, and a dense thickened white sloughing base, having all the characteristics of chronic ulcer of the leg, except that the edges were not indurated,—none of those pertaining to a new growth. The ulcer measured over two inches from the intestinal to the gastric border. The incision was extended in the long axis of the pylorus, entirely through the diseased tissue into healthy mucous membrane, and then joined transversely (Heineke-Mikulicz) by silk sutures, leaving a communication with the duodenum, which would admit easily two fingers. Some difficulty was experienced owing to the greatly-thickened and hard stomach walls in closing the upper angle of the stomach incision, and some leakage was feared and did occur, but the man made a good recovery. He was fed for four days by the rectum, then swallowed fluid food, and at present was taking the regular hospital diet. There had been increase in weight; and no vomiting, no pain occurred after the operation.

The pathologist's report stated that there was no evidence of malignancy, but there was a considerable amount of round-cell infiltration of the muscular wall. There was also an increase of the glandular structures verging on adenoma.

DR. MCBURNEY suggested the criticism that in this case it would have been better had gastro-enterostomy been done. The tendency of chronic ulcers was towards malignancy, or, if cicatrization should take place, it would probably lead to occlusion, and necessitate a second operation.

DR. ABBE thought pyloroplasty was much the safer operation, at

least as to primary results, and that the large aperture which had been left gave better chance for the ulcer to heal than if gastro-enterostomy had been performed, and stenosis allowed to continue at the pylorus. The favorable result seemed to confirm that view in the present case. The strip of healthy mucous membrane on the anterior surface of the opening would, at least, prevent cicatricial contraction going on to complete occlusion.

DR. BRIDDON was of the opinion that pyloroplasty gave more favorable statistics than gastro-enterostomy, for the reason that the former operation was not for removal of the site of the ulcer, usually, but rather for cicatricial contraction following duodenal ulcer.

DR. CURTIS appreciated the weight of Dr. McBurney's objection to pyloroplasty in this case, but he was inclined to agree with Dr. Abbe that the strip of healthy mucous membrane, which formed the anterior surface of the new pyloric opening, would prevent complete closure, even though cicatricial contraction did take place to some extent. Little was yet known about pyloroplasty. The latest report of cases which he had seen gave only twenty-nine, the oldest case having been operated upon not more than four years ago, only two or three more than a year, so that we had no basis for judging of the ultimate result, and it seemed wise in this case to try this less dangerous operation first.

AMPUTATION OF THE PENIS FOR EPITHELIOMA.

DR. CURTIS presented a patient whose penis he had amputated recently for epithelioma. The man was sixty-one years of age, and had had excellent health, except that when a boy he sustained a kick on the right hip, which was followed by hip-joint disease, and resulted in ankylosis, and interfered with abduction of the thigh. This fact determined the form of amputation of the penis, afterwards performed by Dr. Curtis. Five months ago the patient began to be troubled with itching of the penis, which led to irritation, pain, and swelling of the prepuce. Some one relieved the phimosis by an incision, and three weeks later the patient entered the New York Cancer Hospital with a warty epitheliomatous tumor involving the entire prepuce. There appeared to be slight involvement of the inguinal glands. The glans penis seemed not to be implicated. Although approving in general of complete removal of the organ in such cases with the formation of a meatus in the perineum, on account of the ankylosis in

the right hip, Dr. Curtis thought the man could urinate better if he attached the urethra to the front of and low on the scrotum, and that, owing to the superficial character of the disease, this amount of removal would be sufficient for a cure. Accordingly, the penile urethra was dissected out, divided anteriorly about an inch behind the frænum, and the rest of the organ amputated close to the pubis. The scrotum was then incised on its anterior surface, the long stump of the urethra laid in the incision and sutured, so that the meatus was near the bottom of the anterior surface of the scrotum. The urethra was slit up to make a large meatus. The result had been satisfactory. The patient was able to throw a good stream about two feet away from his feet. The inguinal glands were removed at the time of removal of the penis. Hæmorrhage had been slight; union primary. There was very little tendency to contraction in the meatus; and no excoriation of the scrotum, such as occurred from dribbling when the urethra was attached higher up close to the pubis.

DR. WILLY MEYER remarked that in his opinion partial amputation of the penis for malignant disease of the glans should be abandoned, as had partial amputation of the uterus for cancer of the cervix, although admitting that death was generally caused by a recurrence of the cancer in the inguinal glands. He thought the patient would be better off if the penis was entirely extirpated, and the urethra suspended just in front of the anus instead of from the scrotum, as the latter was liable to become excoriated. The method adopted by Dr. Curtis in his case was, however, justified by the ankylosis of the hip, which would have interfered with urination had the urethra been inserted into the perineum. He had extirpated the penis twice, once primarily, in another case for recurrence of the growth in the stump. He had easily controlled hæmorrhage by first doubly tying the two dorsal penile arteries and the profunda penis near the pubic arch, and then cutting the vessel between the two ligatures. In both cases the urethra was transplanted in front of the anus, and somewhat split on its posterior side (artificial hypospadiæ). The first patient lived longer than a year after the operation. He died from recurrent cancer of the inguinal glands, which had, of course, also been removed bilaterally. (The specimen was exhibited.) The other patient died of marasmus not long after the operation.

DR. WYETH said that several years ago he had reported three cases of amputation of the penis at the symphysis, dissecting the urethra out, transfixing the scrotum, and attaching the urethra in front

of the anus,—Humphrey's method. One patient committed suicide about eight months after the operation; the other two were still living, without recurrence, more than ten years since the last operation. His experience, therefore, gave him little anxiety as to recurrence in these cases.

DR. BRIDDON would certainly prefer in ordinary cases thorough removal of the penis and attachment of the urethra at the perineum. In two cases operated upon by him there had been recurrence of the malignant process within a year or two.

NON-RECURRENCE NINE YEARS AFTER REMOVAL OF CANCER OF BREAST.

DR. F. W. MURRAY presented a woman, fifty-three years of age, who had come under his observation in January, 1885, with a history of having a year before felt dragging pains in the right breast, and six months before having noticed a tumor, which gradually increased in size. Dr. Murray found a hard tumor the size of a lemon in the upper and outer quadrant of the right breast, skin unbroken, nipple not retracted, breast freely movable on underlying tissue, axillary glands not enlarged. A few days later he removed the breast through the ordinary elliptical incision, and also evacuated the contents of the axilla, although the glands were not seemingly enlarged. Dressing of iodoform and peat, bichloride compresses, catgut sutures, axilla drained by bone drain. Convalescence uneventful; union *per primam*, excepting a small part of axillary incision. The patient remained under observation several months. Then he lost sight of her until a week ago, nine years after the operation. There was now no evidence of recurrence of the disease. The use of the shoulder was perfect. It was to be assumed, therefore, that the case was one of cure of carcinoma by excision. The tumor had been examined at the time of its removal in the laboratory of the New York Hospital and pronounced scirrhus of the breast.

DR. DAWBARN mentioned that some years ago Dr. Gerster wrote a paper upon a most important point in the technique of this operation; and immediately following this the late Dr. Gross, Jr., had also emphasized it in an essay. Nevertheless, it is to-day forgotten, or practically never adopted; and the speaker believed that if invariably followed this technique would prevent many of the early relapses from involvement of the lungs or other viscera. The point is the following: Ordinarily, in amputation for cancer, the breast is first removed, and

last the axillary lymphatics and lymph-nodes are dissected away. In removing the breast it is necessarily squeezed, handled, and massaged more or less by fingers and retractors. Thereby the cancer-juices may be disseminated through the axillary lymphatics, with which those of the breast are continuous, and so into the general circulation; and when a little later the axilla is opened to complete the operation here, already it is too late: "the stable-door is opened, the steed stolen."

To prevent this peril, the surgeon should simply begin by cleaning out the axilla (thereby cutting off communication between the breast lymphatics and the interior of the body), and end by removing the breast.

DR. W. B. COLEY said, with regard to longevity following amputation of cancer, that he had at present under his care a woman, seventy-one years old, who had had the breast removed nine years ago by Dr. Hodges, of Boston, for carcinoma. There had been two recurrences in that time.

HIP-JOINT AMPUTATION; DIRECT PRESSURE ON COMMON ILIAC THROUGH INCISION IN ABDOMINAL WALL; INTRAVENOUS SALINE INFUSION DURING OPERATION.

DR. CHARLES MCBURNEY presented a boy, fourteen years of age, with the following history: He had received a slight traumatism in August, 1893, while riding a bicycle, and shortly afterwards felt tenderness at the inner side of the upper portion of the right thigh. A tumor developed, grew steadily, reached considerable size, caused much pain. In January, while bedridden, the boy attempted to turn over, felt very severe pain, and lost entire use of the limb. When he came under Dr. McBurney's care, February 5, he was emaciated and anæmic to the last degree. A large tumor involved the upper part of the thigh, reaching apparently as high as Poupart's ligament and half-way down the femur. It was not difficult to make out that fracture of the femur had occurred when he had turned over in bed. The diagnosis was osteo-sarcoma.

DR. MCBURNEY operated with some misgivings on February 10. Realizing that he had two difficulties to deal with, he made preparations to meet them. First, the tumor being so high that it would be impossible to control hæmorrhage by constriction above the tumor, and not liking the blind method of making pressure on the vessels

through the abdominal walls or rectum, he decided to compress the common iliac through an abdominal incision. Second, the tumor being very vascular, at least a quart of blood would be necessarily lost on removing it even after applying the Esmarch bandage to the lower part of the limb, and in order to obviate the danger of collapse taking place, he had an assistant inject 1500 cubic centimetres of saline solution into the arm during the performance of the operation. The amputation having been performed in this manner comparatively little shock occurred, and the boy went on to make an excellent recovery.

DR. MCBURNEY supposed that direct compression of the common iliac by the finger in hip-joint amputation had been practised before, but he could not recall by whom. It was not mentioned in several works on surgery to which he had referred. Regarding intravenous injection of salt solution, this had been frequently practised after the development of unpleasant symptoms following hæmorrhage; but he had never known it to be used before the development of such symptoms, except in the present case. Notwithstanding the very anæmic state of the patient, the severity of the operation, and the removal of perhaps a quart of blood with the limb, the saline injection enabled him to pass through the temporary shock, and doubtless was a large factor in preventing a fatal termination.

DR. ABBE suggested that in such a case of hip-joint amputation considerable blood could be returned to the body if the patient were kept in Trendelenburg's posture for about fifteen minutes before the operation.

DR. CURTIS said that three or four years ago he had had occasion to amputate at the hip-joint for a very large tumor, which extended high on the thigh anteriorly, so that it became necessary to carry his anterior incision above Poupart's ligament and cover the wound entirely with a posterior flap, as in this case. He had thought of making direct pressure, as Dr. McBurney had done, but gave up the idea on account of the danger of a peritoneal wound in the presence of ulceration on the surface of the tumor, and applied the abdominal tourniquet. The latter worked well, and Dr. Murray caught the femoral vessels as soon as they were divided, so that not more than eight ounces of blood were lost; yet the patient was so low that he lived only twenty-four hours. Had he anticipated Dr. McBurney's idea and injected the salt solution during instead of after the operation, perhaps the patient would have survived.

DR. DAWBARN stated, *à propos* of the saline injection during the

hip-amputation, that in the winter of 1891-92 he had spent considerable time in experiments upon numerous dogs in the physiological laboratory at the New York College of Physicians and Surgeons, by the courtesy and with the aid of Professor Curtis. These experiments, which were subsequently published, were for the purpose of ascertaining, by the use of the mercurial manometer and kymographic tracings on paper, the effect, after severe bleeding, of *very hot* infusions of normal salt solution (6 parts per 1000). It was shown that the dogs bore the loss of blood much better, and more quickly recovered strength of heart-beats, if the temperature of the salt water thrown into the blood-vessels were as hot as can possibly be borne by the hand, about 120° F., rather than that ordinarily recommended, namely, the bodily temperature. The works upon physiology state that no albuminoid tissue of the body is coagulated by a lesser temperature than about 40° hotter than this, or nearly 160° F. Still, though injected at 120°, the solution probably does not reach the heart at this temperature.

In quite a number of operations at the Polyclinic since that date, Dr. Dawbarn had used this hot infusion at the time of operation,—a quart in amount or more,—to replace blood lost, to stimulate the heart, and to prevent shock feared. By stimulating the muscular coat of the blood-vessels it maintained or restored their tone, preventing paralytic distention. An analogous instance is the well-known effect of very hot douching upon the unstripped muscle of the uterus in post-partum hæmorrhage.

DR. DAWBARN also referred to a publication of Dr. Edwin Sternberg, about a year ago, in which that gentleman reported two cases in Dr. Mundé's practice treated for hæmorrhage by saline infusion at blood temperature, both of which died; and two parallel cases treated at the speaker's suggestion by infusion as hot as could be borne, both the latter cases recovering.

In reply to an interrogatory by the President, he said that in the experiments upon dogs referred to he had prevented pain by the free use of morphine hypodermically. The dogs were quite conscious, but seemed not to suffer in the least.

URETER TRANSPLANTED INTO A FOUL VESICAL POUCH TO PURIFY IT: RECOVERY.

DR. ABBE presented a man who had entered St. Luke's Hospital under the care of Dr. Markoe, November, 1893, who instituted supra-

pubic and perineal drainage for a large abscess, containing pus and urine, lying between the bladder and rectum. Under thorough drainage the patient was relieved for a time, but when Dr. Abbe went on duty the perineal opening had closed, and the extremely foul cavity was trying to empty itself through a small opening into the bladder. The man was pyæmic. He recognized a small opening from the bladder into the cavity, but, not knowing whether it was a vesical pouch or a true abscess, Dr. Abbe undertook enucleation of the entire thick-walled abscess through a Kraske operation. The pouch was about two-thirds dissected out when he became convinced that it could not be entirely removed without taking away a considerable portion of the posterior wall of the bladder, which the man's bad condition forbade. During his manipulations the ureter, which lay in the thickened walls of the pouch, had been compressed, and later tore across at this point. Now, recognizing that it was a vesical pouch with which he had to deal, and that it was lined with mucous membrane, he decided to leave it and insert the end of the divided ureter into it with the hope that the fresh urine constantly flushing it out into the bladder would cause its walls to return to a healthful condition and to contract into a smaller diverticulum. The result had evidently been as anticipated, for the man has regained his original health. The Kraske wound had healed, and the suprapubic opening is nearly closed. No urine ever leaked into the Kraske wound, and the vesical pouch has shrunk so as to hold about a drachm instead of two ounces, as before the dissection. The clean urine has evidently sweetened the pouch. Dr. Abbe saw no reason why the diverticulum should again suppurate, and believed the man would remain cured.

FURTHER REPORT OF OPERATIONS FOR INJURY TO THE SPINAL CORD.

DR. JOHN A. WYETH read the paper of the evening. (See page 153.)

DR. ABBE said that the experience of Thorburn, of Manchester, who had a large practice in this line, was against operating for spinal paraplegias following fracture, unless the injury was over the cauda equina. Some traumatic paraplegias are only temporary, and disappear slowly as the hæmorrhages which cause them become absorbed. He had found the laceration and contusion of the cord uniformly so severe as to make repair and recovery from the paraplegia impossible.

Dr. Abbe's own experience had also been so unfavorable that he had not advised operative interference the past three years in any of the cases that had come under his observation. A large amount of blood was necessarily lost during the operation, which rendered it a serious procedure, and the chances of relieving the paraplegia were very slight. He had lost one patient some years ago from hæmorrhage and shock attending the operation.

DR. DAWBARN stated that he had recently operated upon a woman who was suffering from complete paralysis from the waist down, following a fall four stories into a cellar. He operated two or three hours after the injury, and removed two spiculæ of bone which pressed upon the cord at the two lower dorsal vertebræ. The cord itself was not lacerated. The wound healed without suppuration, and the patient was now able to walk about.

DR. WILLY MEYER related the case of a young man, aged twenty-one years, who had come under his care in the spring of 1892, with marked paresis of the lower extremities and of the bladder and rectum, coming on immediately after falling from a bridge, thirteen months before. Some slight improvement had taken place in course of time, there having first been complete paralysis. Dr. Meyer performed laminectomy,—removed a mass of bone compressing the cord, opened the dura, but found nothing, except considerable newly-formed vessels. He closed the dura with interrupted sutures, then closed the external wound without drainage. He had expected to find improvement next day, but was greatly disappointed in finding complete paralysis instead. He had first supposed some blood had accumulated in the dura after the operation and caused pressure on the cord. There was only very little improvement in one leg the next five months. After waiting six months he opened the dura again, found a number of cavities in the adherent cord, distinctly gliomatous degeneration. Dr. George W. Jacoby had seen the patient with him. The man went home unimproved. He had just heard that death took place three months ago. The cord had certainly not been damaged during the operation, yet actual harm, at least no benefit, had resulted.

In another case a man entered the German Hospital six days after an injury which crushed the spine, fracturing and dislocating one or more vertebræ, and fracturing a number of ribs, causing complete paralysis of the lower limbs, bladder, and rectum. Dr. Meyer removed the bone posteriorly over the injured spine, but no improve-

ment followed, and the man died about the tenth day after the injury from pulmonary hæmorrhage, caused by a splinter of rib eroding a vessel.

When the spinal cord itself had been injured it never recovered. Only effused blood could be reabsorbed. Thus operative interference in injuries to the cord gave less encouragement, as to improvement or recovery, than in injuries to nerves. Dr. Meyer would in the future operate on injuries to the spinal column and cord of recent date only.

DR. WYETH, in conclusion, said that he thought the cases under consideration were cases in which surgeons were especially justified in taking extreme measures for possible relief. He had always been of that opinion, and had seen no reason to change it. In one of his cases of traumatism to the cord in a man marked improvement had followed operative interference, while in another case, that of a boy, removal of a tumor not larger than the end of one's finger, which was compressing the cord, completely relieved paralysis. This experience alone was sufficient to constitute an unanswerable argument in favor of exploratory interference.

A MULTILOCLAR VERMIFORM APPENDIX.

DR. MCBURNEY presented a vermiform appendix which he had removed from a young woman two days previously during a period of quiescence five weeks after an inflammatory attack. He had seen the patient twenty-four hours after the commencement of the attack of appendicitis, five weeks ago, and, being favorably impressed with its course, he had not operated. She was soon up and about, and when brought to him a few days ago the parents were anxious to have the appendix removed, as they feared a renewed attack during her absence abroad. There had never been a tumor. On removing the appendix, Dr. McBurney found it about four inches long and divided by constrictions into three separate portions or compartments. The third or distal compartment had no communication with the others, and was distended with pus. There was a narrow opening between the other two compartments. Neither of them contained pus. The one next the colon was the largest and healthiest in appearance.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, May 7, 1894.

DR. J. EWING MEARS in the Chair.

PERSONAL EXPERIENCE IN THE TREATMENT OF STRANGULATED HERNIA.

DR. JOHN ASHHURST, JR., stated that of nineteen operations for strangulated hernia performed by him, fourteen were for inguinal hernia. One of these cases was in a child operated on at one of his clinics, and at once removed by the parents, and the further history is unknown. Of the other thirteen patients, ten recovered and three died. The deaths occurred in cases where a fatal termination might have been expected, and were not due to the operation. In one case the hernia had been strangulated for five days, and the patient was a pronounced diabetic. He died of gangrene after the operation, dependent upon the diathetic condition and upon the prolonged strangulation. The second death occurred in a woman of seventy-eight years. The strangulation was very tight, and the bowel was gangrenous at the time of operation. Rupture occurred at the sulcus corresponding to the line of constriction, and death took place from exhaustion in the following twenty-four hours. The third death occurred in a man of intemperate habits, who had a hernia strangulated for thirty hours, and who had been subjected to forcible taxis before admission to the hospital. So forcible had been the taxis that it had resulted in rupture of the bowel in two places. At the operation the scrotum was found enormously swollen and black from effused blood. Twelve inches of the bowel were gangrenous, and the gut presented two openings. A circular enterorrhaphy was done, but the patient died thirty-two hours afterwards from cardiac failure, without evidences of peritonitis.

Four operations were for strangulated femoral hernia, with three

recoveries and one death. In the fatal case the patient died in a collapsed condition thirty-six hours after the operation. There was no evidence of peritonitis.

One case of strangulated umbilical hernia terminated fatally. The patient was eighty years of age, and the strangulation had existed for a number of hours. The patient died of peritonitis.

The youngest patient operated on was a child two years of age, with inguinal hernia. This case ended in recovery. The oldest patient was the woman eighty years old, with umbilical hernia, just referred to.

In one case the hernia after coming down through the inguinal canal did not pass into the scrotum, but turned up in the line of Poupart's ligament, and passed outward along the groin. It was complicated with an undescended testicle. In this case the hernia had been down six days when operated upon. The reporter was able by taxis to reduce a portion of the tumor, but finding that there still remained a hard mass which could not be reduced, he opened the sac and found that the hard lump was the testicle in a gangrenous state, either from a twist in the cord or, as seemed more probable, from the taxis which had been practised rather violently before the patient's admission to the hospital. The testicle was excised, and the patient recovered.

Two cases of irreducible omental hernia were operated upon. In these cases a tumor had been present in the tunica vaginalis for a long time, and while there were no symptoms of strangulation, the weight and bulk of the tumor gave great annoyance, and the patients were exposed to the risk of a portion of the gut coming down at any time. In these cases, most of the omentum was cut away after securing its neck between two ligatures.

While he had reduced a good many strangulated hernias by taxis, and agreed that it should be the surgeon's first thought, and while, if practised with care and skill, it is a safe method, and one which will usually succeed when resorted to in time, yet he believed that in the hands of an inexperienced practitioner, who sees but few cases of hernia, taxis is an unsafe procedure. Under such circumstances, he thought that the patient would sometimes be safer with the operation of herniotomy than with taxis, for herniotomy is not a very difficult operation, and not very dangerous if performed with caution, whereas taxis, while seeming to be very simple, yet if employed with great persistence and force may lead to the most serious consequences. His own cases of herniotomy which resulted fatally

had been mostly subjected to prolonged taxis. Taxis, therefore, has its limitations, and should be resorted to with great gentleness and with great caution, except in the hands of those surgeons who are sufficiently familiar with the anatomy and treatment of strangulated hernia to feel that they may use the method more freely and more systematically.

DR. JOHN B. DEEVER asked the experience of the Fellows with reference to anastomosis. He believed that anastomosis operations are of value in but few cases of strangulated hernia. He had tried the method more by way of experiment, but the cases had not recovered. In order to do this operation it is necessary to pull down additional bowel. In gangrenous hernia it is better to allow the bowel to remain in the wound or, as he preferred, to cut it away. In hernia the condition of the patient does not warrant the procedure of anastomosis, and even under the most favorable circumstances the operation is anything but satisfactory.

DR. J. M. BARTON remarked that he had not spent much time with taxis. He had so often found the bowel in such a doubtful state, even after short strangulation, that he feels much safer, if there is any question as to its condition, to operate at once. In one case the bowel was entirely gangrenous eighteen hours after the violence that produced the strangulation.

As to the advisability of making lateral anastomosis immediately after removing gangrenous bowel, the condition of the patient rarely warrants any prolonged operation, and he thought that the rule now is, in intestinal obstruction, irrespective of cause, to do nothing further than establish an artificial anus at the first operation.

DR. O. H. ALLIS said that of three cases of strangulated umbilical hernia upon which he had operated, all recovered. He thought the operation in umbilical hernia to be no more dangerous than in femoral or inguinal hernia. Where the constriction has been prolonged, probably any form of hernia means death. From what he had seen of umbilical hernia, he maintained that if it is a favorable case it is as likely to get well as a case of femoral or inguinal hernia.

DR. H. R. WHARTON thought that the most difficult point to decide in the treatment of strangulated hernia is the question whether or not to put the bowel back when it shows the marked effect of strangulation. In many cases where there is not absolute sloughing, it is hard to decide whether or not a bowel whose nutrition is much impaired will recover. Within the past ten days he had had a case

of femoral hernia where the color of the bowel was very unfavorable. After dividing the stricture he noticed some improvement in the color of the bowel, and put it back with some misgivings. The patient progressed satisfactorily without rise in temperature.

DR. RICHARD H. HARTE had seen two cases of Littre's hernia. One was brought to St. Mary's Hospital after prolonged taxis, and the hernia was supposed to have been reduced. The symptoms did not subside, and when he saw the case the man was dying. At the autopsy it was found that a small portion of the bowel had been caught and was strangulated. The second case was seen at the Episcopal Hospital. In this case, too, operation revealed a small portion of the bowel which was caught and strangulated. These cases are apt to be overlooked until rather late symptoms of strangulation make their appearance.

DR. J. M. BARTON said that he had had six cases of umbilical hernia, and had had the misfortune to lose two. In these cases, the strangulated bowel is invariably in the centre of a mass of omentum. The small knuckle of intestine is at the very base, and any pressure on the surface would be utterly useless. In a case of this kind, seen some time ago, he grasped the abdomen above and below the hernia and lifted the abdominal walls, actually raising the patient from the bed. At the second attempt this proved successful. He had employed the same method in another case with success.

DR. JAMES COLLINS said that the youngest case on which he had operated was a child two years old. It got well. His oldest case was eighty-two years old. He emphasized the necessity of opening the sac. In one case where he opened the sac, he found, on drawing down the bowel, another band about the intestine. He had seen the same thing in other cases.

DR. WILLIAM G. PORTER emphasized the point made by Dr. Collins as to the necessity of drawing down the bowel. He had seen two cases where the bowel in the sac was carefully examined and found all right and returned, and was immediately followed by a gush of liquid fæces. His explanation of these cases is that the strangulated portion had returned and a healthy portion of the bowel had come down.

DR. SAMUEL ASHHURST had seen a case like those referred to by Dr. Harte, and this prejudiced him against the operation without opening the sac. Taxis was employed and the tumor was reduced, but the symptoms did not disappear. The patient died,

and at the post-mortem there was found a small portion of bowel still retained within the internal ring, not involving the whole lumen.

DR. THOMAS R. NEILSON had had two cases of Littre's hernia or partial strangulation of the bowel. One was in an elderly woman brought to the hospital after five days of the so-called obstruction of the bowel. The patient was practically moribund, but at the earnest solicitation of the patient he operated. The constriction was found at the internal abdominal ring, involving only a portion of the gut. The patient died shortly after the operation. The second case was in a young man with left inguinal hernia. The patient presented a tumor not larger than a large marble, exceedingly tender, with pain at the umbilicus and a tendency to nausea. He operated and found a Littre hernia of the small intestine, and the patient recovered. The possibility of the occurrence of this hernia should not be overlooked.

DR. J. EWING MEARS reported one case of umbilical hernia in which strangulation had existed for forty-eight hours and general peritonitis had supervened. He operated and made an artificial anus, but the patient died within twelve hours.

DR. JOHN ASHHURST, JR., endorsed the statement that in the majority of cases of gangrenous hernia it is not proper to make an anastomosis of the bowel at the time of the herniotomy. Whether we should open the gut or resect a portion of it should be decided by the extent of the gangrene. If there is only a patch, it is sufficient to open the bowel; if a large portion is gangrenous, it is probably safer to remove it. In the majority of cases it is proper only to establish a false anus, which may be subsequently dealt with. The only exception is where the surgeon has reason to fear that the portion of bowel involved is high up in the small intestine, when so much of the bowel would be cut off from exercising its digestive function that the patient would die of inanition, even if he should survive the immediate results of the operation. Under such circumstances, if the patient is in a condition to justify further interference, it would be better to complete the operation by uniting the bowel according to one of the methods suggested. In the case in which he removed twelve inches of the bowel and united the ends by circular enterorrhaphy, no extravasation occurred, and the patient's death did not appear to be due to the operation.

THE TREATMENT OF CONTUSIONS AND SPRAINS OF THE BACK.

DR. HENRY R. WHARTON reported a series of nine cases of severe contusion and sprain of the back, the lumbar-dorsal region being the part most frequently injured. As regards the treatment of contusions and sprains of the back, he considered that rest in bed is a matter of the first importance, and, in addition, he had found that the pain and general discomfort of the patient is much diminished, and the time of treatment much shortened by having the back firmly strapped as soon as the patient came under observation. The strapping of the back is effected by taking strips of resin-adhesive or of rubber-adhesive plaster, $2\frac{1}{2}$ inches in width, and long enough to extend half way around the body; these are applied so as to cover in the back, one strap slightly overlapping the other, from a point just below the junction of the last lumbar vertebra with the sacrum to the lower ribs. These straps were often removed at the end of two or three days, and the back was restrapped if the pain and tenderness still persisted. The straps were usually allowed to remain in place until the patient was up and about without complaining of pain or discomfort in the region of the injury. In cases of severe contusion the straps often require renewal a number of times.

This method of treatment of contusions of the back was first called to his notice by Professor Ashhurst while serving as resident physician in his wards at the University Hospital, and since he had employed it he had entirely discarded the use of fomentations and stimulating lotions, which are generally recommended in the treatment of these injuries.

After the subsidence of the acute symptoms of these injuries massage is valuable, but in the early stages strapping will be found the most satisfactory. The application of straps employed as above described is usually promptly followed by relief of pain, and the fixation produced allows the patient to move with more comfort, and the time required for the recovery of the injured parts is much shortened.

EDITORIAL ARTICLES.

CHAPUT ON THE INOSCULATION OF THE URETERS WITH THE INTESTINE.

CHAPUT¹ gives an excellent summary of the literature of the subject of uretero-intestinal anastomosis, and describes the indications and technique of this somewhat unusual operation.

The union of the ureters with the intestine is not at all an unusual condition. It is well known that during the entire life of birds urine is discharged into the cloaca, which receives faecal matter as well. Even in the human foetus the secretions from the kidneys during the first months empty into the cloaca. This continues until the time when, in the progress of development, the bladder is entirely separated from the rectum.

The establishment of an artificial communication between the ureters and the intestine by means of surgical procedures may be, under certain conditions, of great benefit to the patient. The extensive involvement of the bladder in cancerous or tubercular disease, necessitating either its total resection or merely resection of the base alone, renders such a procedure advantageous. In cases, too, of exstrophy of the bladder it should become possible, after the diverting of the urine into the digestive tract, to extirpate entirely the inflamed and bleeding area of the mucous membrane forming the posterior bladder-wall, and occupying the hypogastric region.

This intestinal exit of urine is also of great service in inoperable cases of vaginal fistula, and in wounds, ruptures, or calculus of the ureter, for in such cases reliance cannot be placed upon direct suture.

The first efforts made to direct the course of the urine into the

¹ Archives Générales de Médecine, January, 1894.

intestine were in cases of exstrophy of the bladder. For the relief of this condition Simon¹ passed a loop of thread through the walls of both the ureter and the rectum, and tied them tightly together. Necrosis occurred at the point of ligation, and a communication resulted. Unfortunately, urine continued to appear at the opening in the skin, although the artificial fistula remained patent. The patient died of pyelonephritis.

Thomas Smith² operated on a child of seven, and sutured successively the two ureters into the colon. The lumbar incision was used. The second operation was quickly followed by death. The autopsy showed that on the left side, the first one subjected to operation, the point of exit of the ureter was obliterated, causing hydronephrosis. On the right side, inflammation of the ureter and acute septic pyelonephritis were found.

These fruitless attempts found few imitators, and the question seems to have been held in abeyance for many years. Its answer was next sought from the experimental stand-point.

Glücke and Zoller³ tried upon dogs the effect of total extirpation of the bladder with subsequent deflection of the ureters sometimes to the skin, sometimes into the rectum. The latter procedure was in all cases unsuccessful.

About the same time Bardenheuer tried to suture a single ureter into the intestine. The animals recovered from the operation, but an autopsy revealed hydronephrosis in each case, evidently due to a contraction of the ureter at its orifice.

Novaro reported to the Italian Surgical Society, in 1887, that he had produced an anastomosis of both ureters with the intestine in three dogs. Two of the animals died; the third recovered, and was finally able to urinate through the anus and to retain urine for considerable periods of time.

Paoli and Busachi⁴ reported a number of similar experiments. In some cases the ureters were sutured into the intestine, in others

¹ London Lancet, 1852.

³ Berliner klinische Wochenschrift, 1881.

² St. Bartholomew's Hospital Report, 1879. ⁴ Medical Congress of Pavia, 1888.

into the bladder itself. These cases are interesting, because in nearly every case a constriction developed at the point of exit of the ureter. Four trials were made. Two of the dogs died, one of pyelonephritis, the other of infiltration of urine. The third presented a dilatation of the intestine with anæmia of the corresponding kidney,—a fact which is explained by the investigations of Albarran, who has shown that hydronephrosis results from gradual contraction, while if the outlet is suddenly closed atrophy of the kidney occurs. The fourth animal made a good recovery.

Tizzoni and Poggi¹ report a series of very complete experiments, but their methods vary considerably from those of other investigators. Briefly, they first isolated a loop of intestine after the method of Thiry. At a subsequent operation they ablated the entire bladder, then sutured the ureters into the artificial intestinal loop, and finally sutured this loop to the neck of the bladder. This is, of course, in a literal sense, an anastomosis of the ureters with the intestine, but the conditions are so different as to render the experiments of little value for purposes of comparison.

Tuffier² tried twice to cause the ureter to empty into the rectum. Both animals died of pyelonephritis.

A more extensive series of experiments is reported by Harvey Reed.³ The author comes to the conclusion that an implantation of a single ureter into the intestine is easy and safe, but that a bilateral implantation is dangerous. Just why two operations, safe in themselves if done on different animals, should be dangerous when done on the same animal is difficult to explain. In six bilateral implantations there were six deaths, either from peritonitis or from hydro-nephrosis. Three unilateral implantations were performed. In one case union failed; in the second acute nephritis resulted; in the third, however, a perfect cure was obtained, with neither nephritis nor dilatation of the ureter. This last case is to be borne in mind,

¹ *La Riforma medica*, 1888.

² *Annales des Maladies des Organes Génito-urinaires*, 1888.

³ *ANNALS OF SURGERY*, 1892.

for it proves that such an anastomosis can be made successful when skilfully performed and under proper conditions.

Morestin¹ did the bilateral operation ten times. All the cases died from peritonitis, pyelonephritis, or hydronephrosis. In six unilateral operations three died from peritonitis and three from hydronephrosis.

Chaput himself has tried similar experiments upon dogs many times and in a great variety of ways. His results are no better than those of his predecessors. He says, "I believe that the difficulty in obtaining good results in these operations upon dogs is due in part to the very small size of the ureter in the animal, and in part to the great rigidity of the intestinal walls causing the sutures to cut through the tissues and rendering union almost impossible. Moreover, even if the animal escape peritonitis and hydronephrosis, there still remains the great danger of septic infection from the intestinal contents themselves and the consequent pyelonephritis. The experiments upon dogs, therefore, are not to be relied upon to furnish material from which to draw valuable conclusions as to the advisability of similar operations upon man." More satisfactory results could doubtless be obtained from experiments tried upon animals of larger size than the dog, but the practical and economic difficulties are so great as to be practically prohibitory.

The artificial union of the ureter with the intestine has recently been tried again upon man for the purpose of relieving various serious conditions. The first of these cases was operated upon by Küster. The operation consisted of a complete cystectomy for cancer of the prostate. Anastomosis of the ureters with the rectum was effected.²

The result was not satisfactory, for the patient died upon the fifth day after the operation. The autopsy showed a purulent peritonitis, and there were many evidences of renal infection. The ureters were not dilated, but the sutures between them and the rectum had not held. The retro-peritoneal glands were infiltrated with carcinomatous deposit.

¹ Société Anatomique, 1892.

² Langenbeck's Archiv, 1891.

The next instance in which this anastomosis has been tried was a case operated upon by Chaput himself for the relief of a uretero-vaginal fistula, left after an incomplete vaginal hysterectomy which had been performed for a purulent salpingitis; the ureter had been wounded, and a uretero-vaginal fistula was the result. The fistula was so high up and the orifice so surrounded by a mass of distorted cicatricial tissue that the idea of causing the opening to communicate directly with the bladder had to be abandoned. A nephrectomy had been decided upon, and preparations for its performance had been begun when the article of Reed's appeared, in which this author reports the successful implantation of the ureter of a dog into the animal's intestine. The opportunity seemed a good one to try this procedure upon a human subject, and, after several attempts upon a cadaver, Chaput performed a similar operation upon the patient in question, September 13, 1892.

The abdominal incision was made in the left iliac fossa, beginning above the anterior superior spine of the ilium, and curving at its lower end to the median line. The peritoneal cavity was opened, and the colon and the small intestines were held to one side. The posterior layer of the peritoneum was next divided on a line, ten centimetres in length, parallel with the insertion of the meso-colon. The peritoneum was reflected as far as the vertebral column and the ureter sought for. One of the iliac veins was first opened by mistake, and, finally, after considerable search, what was at first supposed to be the iliac vein was found to be the greatly-distended ureter. This was first picked with a bistoury, to make sure of the diagnosis, and then divided between two clamps.

The anastomosis of the ureter was the next thing attempted. The orifice of the renal portion of the divided ureter was made to meet the colon on its posterior and lateral aspect at a very acute angle. A row of sutures was inserted uniting the serous layers of the two structures along the posterior semicircumference. The intestine was then incised in a direction corresponding to the ureteral orifice, and a corresponding row of sutures uniting the mucous layers

was placed in position. The interior diameter of the ureter was about eight millimetres, and from three to five sutures were placed in each row. The anterior lips were then brought into close apposition by two similar lines of sutures,—the first in the mucous, the second in the serous layers.

Before closing the belly the open end of the vesical portion of the ureter was closed by means of a large silk ligature. A gauze drain was placed in the post-peritoneal space. The abdominal wound was closed by a single row of silkworm-gut sutures. The results of the operation were excellent, fever was entirely absent, and the patient recovered without a single complication.

At the end of a year a comparison of the discharge from the rectum and from the bladder for twenty-four hours gave the following results: Vesical urine, 1250 cubic centimetres; urea, 24 grammes per litre. Liquid material eliminated by the rectum, 270 cubic centimetres; urea, 4.5 grammes per litre. The patient has three liquid movements daily, which contain solid matter in suspension. These passages are easily retained in the rectum, and there is no discomfort experienced. The left kidney is not enlarged, and the amount of urine excreted is fairly abundant. The diminution in the amount of urea in the urine of this side is explained by the fact that secondary changes had occurred in the kidney as a result of the contraction of the orifice of the ureter during the existence of the fistula.

A second case is also reported by Chaput. The patient was a woman, aged forty-five, who entered the hospital (la Salpêtrière) February 4, 1892. Besides all of the typical symptoms of tubercular cystitis, the examination showed tubercular disease to exist in the lungs and also in the hip. A profuse metrorrhagia, occurring every two or three months, had existed four years before; but this had subsided after two years, but she still suffered from severe and continuous hypogastric pain, exaggerated by menstruation.

After her entry into the hospital, a great variety of methods of treatment were tried for the cystitis: boric acid, nitrate of silver, turpentine, and borate of soda were tried in turn for lavage; the

urethra was dilated; a sound was allowed to remain in the bladder for weeks; hot baths were tried; the pains were sometimes slightly relieved, but soon returned with their former severity.

Finally, in July, 1892, a suprapubic section was made. The walls of the bladder were one centimetre thick, and the mucous membrane showed numerous irregular ulcerations. As a result of this operation the patient's general condition improved for some months, but in November the bladder was so greatly contracted that an extremely disagreeable vesical fistula remained, which could not be closed, and which caused the patient much distress.

Encouraged by the success of his first case (*vide supra*), Chaput then decided to suture the ureter into the colon, and on the 25th of November this operation was performed upon the left ureter. A vertical incision was made along the outer border of the left rectus muscle, curving at its lower end nearly to the median line. The intestines were pushed aside, and the posterior layer of the peritoneum was divided, parallel with and outside of the sigmoid flexure of the colon. The ureter was easily isolated, and divided between two clamps. The lower portion was at once ligated, and the suture of the renal portion to the intestine was begun at once. The ureter was of large size, as large as the little finger, and the mucous membrane was thickened and inflamed. One-half of the circumference of the serous layer of the ureter was first sutured to the postero-external face of the colon before the latter was opened. Three fine silk sutures were used. An incision, one centimetre in length, was then made through the wall of the colon, parallel with the orifice of the ureter, and about four millimetres from the first row of sutures. The posterior and anterior lips of the mucous layers and the anterior lip of the serous layers were then united by sutures in the order named. The abdominal wound was treated as in the preceding case. Cure was rapid and complete.

As a result of the operation the patient had about eight watery movements daily. The hypogastric pains and fistula were not especially affected by this preliminary operation.

Three months later the general condition of the patient was fairly good, and there were but four or five passages daily. The anastomosis of the right ureter with the cæcum was decided upon, and this operation was performed on the 1st of March, 1893. The same method was used as in the first operation. The ureter was as large as the thumb, and all of its walls were thickened and congested. There was no fever produced, but she became comatose, and died on the same day. The diarrhœa which had existed was entirely checked; as the anastomosis of the second ureter would have added to this condition, there can be no doubt but that suppression of urine was the immediate cause of death. No autopsy was performed.

The author calls especial attention to the fact that, in this case, in spite of the ureteritis, and the effect of the chloroform, the left kidney bore the anastomosis of the ureter with the intestine for three months, and did not cease to functionate. He concludes, therefore, as a result of this observation, that this form of anastomosis is a favorable one, since, notwithstanding the adverse conditions, the operation itself was successful, and was free from unfavorable complications either on the side of the kidney or on the side of the intestine. The frequency of the discharges from the rectum which decreased towards the last is to be attributed to the polyuria existing in a kidney already diseased. It is fair to assume that eventually the large intestine would have become sufficiently dilated to act as a reservoir for the urine, and so render the evacuations less frequent.

Operative Technique of the Anastomosis of the Ureter with the Intestine.—The ureter may be led into the digestive tract at the level of the rectum, of the ascending or of the descending colon, or even into the small intestine. Tizzoni and Poggi have united the ureters with a loop of intestine isolated and opening upon the skin; with the urethra; or with another portion of the intestine.

The inosculation in the region of the rectum seems to Chaput to be contraindicated, since the ureters lie so far distant from that portion of the gut as to make it necessary to denude them for a considerable distance; moreover, it is extremely difficult to place the sutures

properly in the depths of the pelvis. The unsuccessful attempt of Küster appears to support this theory; his sutures did not hold, and the patient died of peritonitis.

Anastomosis with the small intestine offers no advantages, and the urine is likely to interfere with digestion and with absorption.

The ascending and descending portions of the colon are without doubt the points of election for the proper performance of the anastomosis with the ureters.

In performing anastomosis with the ascending and descending colons, Chaput recommends the use of the following incision which he used in his three operations: it commences above at the border of the costal cartilages, about eight centimetres from the median line; it extends to the level of the anterior superior spine of the ilium, and then curves to within about two centimetres from the median line. It is made layer by layer until the peritoneum is reached. This is then opened, the large intestine is recognized, and this together with the neighboring coils of the small intestine is pushed aside, and held by means of a compress in the hand of the assistant.

The posterior parietal layer of the peritoneum is then incised for a distance of ten centimetres in the iliac region. The internal peritoneal lip is seized with the hæmostatic forceps, and with the fingers it is easy to strip up the peritoneum as far as the vertebral column. The entire region is sponged dry, and the ureter can usually be recognized without difficulty. The ureter is grasped by two toothed forceps and divided between them. The inferior portion is at once ligated and replaced.

The superior portion is then held in contact with the postero-internal aspect of the descending colon and sutures are inserted as follows: The posterior lip of the ureteral orifice is first fastened to the still intact intestine by three or four sutures passed through the muscular layers only. The intestine is then incised for about one centimetre several centimetres below the preceding row of sutures. The mucous layers of the posterior lips of the two orifices are immediately sutured together, and finally the anterior lips are united by a

row of sutures through the muscular walls. (Fig. 1.) Some supplementary sutures are next placed at the extremities of the intestinal incision which gapes a little. In case the ureter is too small, and the walls too thin, to stand two layers of sutures, its fixation may be secured by three muco-mucous sutures. The entire end of the ureter should finally be buried at the bottom of a fold of the intestinal wall by means of two rows of sero-serous sutures so placed that it will be completely covered for a distance of about two centimetres. (Figs. 2 and 3.) It only remains to drain the exposed surface with a strip of gauze, and to suture the abdominal wall.

The anastomosis with the ascending colon is performed in precisely the same manner as with the descending.

The Formation of a Bladder from a Loop of Small Intestine.—

In order to avoid the frequent passages from the bowels that may result from the anastomosis of both ureters, the endeavor may be made to divert them into a loop of small intestine which in its turn empties into the descending colon. This operation should be performed at two separate operations.

At the first of these a portion of the small intestine should be selected not far above the ileo-cæcal valve, and a loop cut out. This loop should be carefully washed out, and the open ends united to one another by invagination. The two ends of the main line of the gut may be united by any convenient method of enterorrhaphy. At the end of five days the belly is reopened, and the hollow ring of intestine should be found somewhat distended by intestinal juice.

At this second operation the two ureters are united with the isolated loop after the mode of procedure indicated above. Finally, the artificial bladder thus formed is made to inosculate with the descending colon through an orifice about one centimetre in diameter.

Chaput has performed this series of operations many times upon dogs, and although the results have been unsuccessful for the reasons already given, he has been able to study the operative technique carefully, and states positively that they can be readily carried out in man.

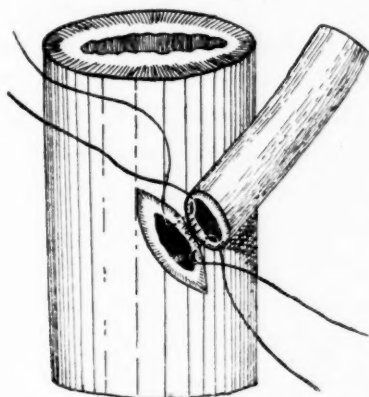


FIG. 1.—Suture of the mucous layers of ureter and intestine.

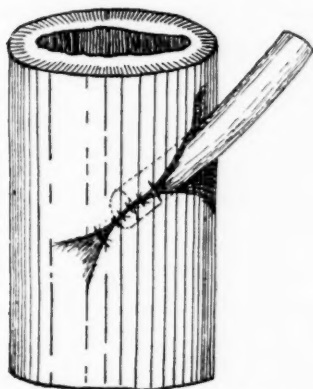


FIG. 2.—Point of anastomosis buried by infolding the intestinal serosa.

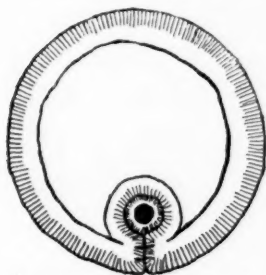


FIG. 3.—Transverse section of wound at point of anastomosis showing the infolded ureter.

He thinks it to be easier and less dangerous to make this anastomosis of the loop of small intestine with the large intestine than with the urethra. Before such a procedure can be adopted as warrantable, it would be necessary to have more reliable data as to the results obtainable from bilateral anastomosis with the intestine, and resort to the creation of such an artificial bladder only after it has been shown that the anastomosis with the colon is necessarily followed by frequent and watery passages from the bowels.

Chaput thinks that the stools would not be more frequent than with the unilateral operation, for the entire extent of the large intestine would be utilized.

Indications for the Intestinal Anastomosis of the Ureter.—This operation should not be one of choice, but of necessity; it is applicable only in those cases where other means for the preservation of the kidneys are impossible or are contraindicated.

In cases of uretero-vaginal fistula the classic operations of Simon, Bandl, Schede, or of Poggi should first be tried. If the seat of the fistula is low down, the directing of the ureter into the bladder by the aid of the hypogastric section may be attempted; in those cases, however, where the fistula is at an inaccessible point, the intestinal anastomosis is easier and less fraught with danger than its implantation in the bladder by a laparotomy, as recommended by Bazy. The intestinal anastomosis is much preferable to nephrectomy, which deprives the patient of an organ so necessary for existence.

Unilateral anastomosis is indicated in those cases where the ureter is wounded high up, as may happen during the course of a laparotomy, or as a result of a blow or kick upon the abdomen.

After the removal of a calculus in the ureter, if the ureteral wall is in such a condition that it cannot be united, the intestinal anastomosis will be found of great value.

In a case of cancer of the bladder, where the growth encroaches upon the outlet of one of the ureters, the removal of this portion of the base of the bladder will necessitate the suture of the ureter to

another portion of the bladder; but if the entire resection of the bladder is indicated, the anastomosis with the two parts of the colon is all that can be done.

The same thing holds true in severe cases of tuberculosis rendering entire resection of the organ imperative, although, unfortunately, the renal lesions, which are so apt to exist at the same time, render permanent benefit unlikely.

In exstrophy, Pousson has advised, and Tuffier has executed, a cystorectal anastomosis; but the operation of Tuffier usually leads to a permanent cutaneous fistula. This is not the case with the intestinal anastomosis of the ureters, which obviates entirely this inconvenience, and which is certainly more satisfactory than the ingenious procedures of Segond. The author summarizes his views as follows:

(1) The anastomosis of the ureters with the intestine is an easy and a favorable operation. That it does not necessarily lead to a hydro-nephrosis due to contraction of the orifice of exit, nor to pyelo-nephritis due to ascending infection, is proved by his personal observations.

(2) The bilateral operation, successfully performed by Novaro upon dogs, can certainly be successfully performed upon man.

(3) The exit of urine into the intestine does not cause special inconvenience, and neither impairs digestion nor irritates the mucosa; the stools are somewhat more frequent, but not more so than normal micturition.

(4) The operation is a valuable recourse in certain cases where the more simple methods of intervention are inapplicable.

It is particularly indicated in complete resection of the bladder—cancer, tuberculosis, exstrophy—in fistulas of the ureter, and in wounds and ruptures of the organ, and in certain cases of ureteral calculus.

H. P. DE FOREST.

ON THE SURGERY AND PHYSIOLOGY OF THE SPLEEN.

THE demonstration was made by Zacaralla in 1549 that the human spleen could be successfully removed. Köberle, Péan, Credé, and others have also performed the operation upon the human subject.

As a result of these operations there was observed an increase in the lymphoid tissue in other parts of the body, as evidenced by an enlargement of the lymphatic nodules.

Some physiologists have shown that the spleen is a blood-forming organ (Gerlach, Funke); others claim that the red blood-cells are destroyed in this organ (Kölliker, Ecker). These discrepancies are due to the fact that the ratio of red cells to white cells is probably greater in the splenic artery than in the vein, and either the theory that white cells are formed or that red cells are destroyed in the spleen might be based upon this fact. Gibson reconciled these theories by claiming that in the spleen the colored corpuscles undergo disintegration, and that white corpuscles are formed which eventually become transformed into red cells.¹ The evolution of what little we know of the function of the spleen has been slow and fraught with much contradiction.

The surgery of this organ has scarcely begun. Forty years ago Kùchler, of Darmstadt, ventured to remove an hypertrophic malarial spleen. His patient died, and he was sharply criticised by the medical societies of his day.² Adelmanm endeavored to support Kùchler, but the statistics upon the strength of which he made his decision were very meagre, and involved cases in which the spleen had been prolapsed through some abdominal wound. The only case at that time, which had been operated upon for organic disease, was a single case in which Quittenbaum, in 1826, had done splenectomy.

Vulpus, of Heidelberg, who has compiled an immense number of statistics upon this subject, and to whom is due the credit of all of the following figures, has shown that at the present time, out of more than one hundred cases of laparosplenectomy, the number of cures has been about 50 per cent.; and that the diseased spleen is no longer a *noli me tangere* for the knife of the surgeon.³ He has

¹ Landois: Lehrbuch der Physiologie des Menschen.

² König: Lehrbuch der speciellen Chirurgie.

³ Vulpus: Beiträge zur Chirurgie und Physiologie der Milz; Beiträge zur klinische Chirurgie, Bd. XI, 1894.

reported five cases operated in Czerny's clinic,—two for leukæmia, and one each for enlarged wandering spleen, simple hypertrophic spleen, and necrosis of the spleen. The latter case developed a pleuritis with effusion on the left side, which became empyemic. This complication retarded the convalescence, but the patient was eventually cured, and the removal of the spleen caused no general disturbance.

The case of idiopathic hypertrophy of the spleen developed an interesting condition of the blood. The proportion of white to red cells had been normal, but on the day following the operation the ratio was 1:60. Gradually this excess of white cells subsided, and the ratio again became normal (1:500) at the end of four months.

Of these five cases, two died as a direct result of the operation. Both of these were pronounced cases of leukæmia. The hæmorrhagic diathesis in these cases was the cause of an overwhelming bleeding, which was so far beyond the control of the surgeon that these two cases sufficed to teach the Heidelberg clinic that the leukæmic spleen was not a subject for operation.

The two most satisfactory cases were those of hypertrophic spleen, for which there was no discoverable cause, and which, from the size and the general disturbances which they caused, were removed. These patients made a good recovery.

There have been reported twenty-eight cases of laparosplenectomy for leukæmic hypertrophy. Twenty-five of these died from the immediate effects of the operation. Twenty died from hæmorrhage during the first twelve hours after the operation, two of septic peritonitis, and one of shock. In two cases the cause of death is not stated, though hæmorrhage was the probable cause, because death took place within five hours after the operation. But three cases have survived. Franzolini's case was one of mild leukæmia with a moderately enlarged spleen, and was permanently cured, the blood being normal at the end of three months. Bardenheuer's patient died thirteen days after the operation of general prostration from the disease. The patient upon whom Burkhardt operated went eight months, and then died of weakness from the progress of the disease.

It is, therefore, evident that out of these twenty-eight cases but one cure is reported ; and the diagnosis of this case must be looked upon with some doubt. The cases of Burkhardt and Bardenheuer have demonstrated that the operation can be carried out successfully in extreme cases of leukæmia with very large tumors, but that, even when the great danger of hæmorrhage has been overcome, the patients subsequently perish from the exhaustion of the disease. The conclusion which would be drawn from these facts is that extirpation of the spleen does not cure the disease, but that it is a disease of other tissues as well, and continues to exist when this organ is removed. It is, therefore, according to Vulpius, very probable that the observations of Franzolini are faulty.

The leukæmic tumor of the spleen is absolutely not to be operated upon in cases of advanced disease,—that is, when the blood-cell ratio is 1 : 50.

Only in cases in which there are but slight changes in the blood and when the tumor causes great inconvenience can operation enter into consideration. This, of course, would be very rare, for a very large spleen would be found with marked blood-changes. In no case, then, can the operation be hoped to do more than relieve the immediate symptoms arising from the physical presence of the tumor.

A second group of statistics include the cases of laparosplenectomy for malarial and idiopathic hypertrophy and wandering spleen. It is a fact that enlargement of the spleen is often the cause of its wandering.

In this group sixty-six cases can be found in the literature. Of these, twenty-six could be traced to malaria as the ætiological factor ; while in twenty-one the hypertrophy had to be called idiopathic. In the remaining nineteen cases, the dislocation of the spleen was the cause which indicated operative treatment. Death resulted in twenty-four cases,—a mortality of 36.4 per cent. Eleven of the deaths occurred in cases of malarial and simple hypertrophic spleen, and only two in cases of wandering spleen. The last case was one of very large spleen ; and in this and the other the patients died of peritonitis.

When cases of wandering spleen and cases of idiopathically enlarged spleen are classed together, the mortality of operation is 32.5 per cent. against 42.2 per cent. in malarial spleen. All of the cases which perished after operation for hypertrophic or wandering spleen were cases in which the tumor was of very large size. A study of these cases would show that the limit of safety is a tumor of 3000 grammes. Death followed from shock right after the operation in three cases, from exhaustion and sepsis in one case each, and from hæmorrhage in seven cases.

The case is quite different with malarial tumors, in which there seems to be no relation between the size of the tumor and the mortality, and in which many of the cured cases were those in which the tumor was very large.

Of the eleven cases of death, two were from unknown causes; one each from shock, collapse, and peritonitis; one from nephritis, which resulted in death a month after the operation; and five from hæmorrhage.

The statistics, therefore, stand as follows: mortality in laparosplenectomy for non-leukæmic enlargement and for wandering spleen 20 per cent., and for malarial spleen 40 per cent. The mortality in cases of echinococcus of the spleen is 40 per cent. Four cases of sarcomatous spleen have been extirpated. One case died at once, and the other three perished from recurrence.

The three attempts to extirpate the congested spleen were unsuccessful, as was an attempt to remove an amyloid spleen. Such attempts as this are to be discouraged because these conditions are associated with general disease.

Of very great interest is Lane's attempt to save two patients from bleeding to death from traumatic rupture of the spleen. Though both cases were unsuccessful, the operation, according to Vulpius, is eminently justified.

Burke¹ has reported a case operated upon for tuberculosis.

The cases of laparosplenectomy in the literature amount to 117.

¹ Lawrence Burke: Dublin Journal, LXXXVII, p. 540, June.

Of these 59 (50.4 per cent.) were cured, and 58 (49.6 per cent.) died. When from these statistics are excluded cases which, according to Vulpus, should not have been operated upon,—namely, leukæmic, chronically congested, and amyloid spleens,—85 cases remain. Of these 85 29 died, which gives a result of two-thirds of the cases cured.

The following is a table of the cases in the literature as collected by Vulpus :

	Disease.	No. of Cases.	Cured.	Died.
1	Leukæmia	28	3 = 10.7 per cent.	25 = 89.3 per cent.
2	Hypertrophy (simple, malarial, and wandering spleen).	66	42 = 63.6 "	24 = 36.4 "
	(Malarial hypertrophy alone.)	(26)	(15 = 57.7 ")	(11 = 42.2 ")
3	Echinococcus	5	3 = 60 "	2 = 40 "
4	Simple cysts	4	4 = 100 "	
5	Sarcoma	4	3 = 75 "	1 = 25 "
6	Abscess	3	3 = 100 "	
7	Chronic congestion	3	. . . . .	3 = 100 "
8	Amyloid degeneration.	1	. . . . .	1 = 100 "
9	Syphilis	1	1 = 100 per cent.	
10	Rupture	2	. . . . .	2 = 100 "
	Total	117	59 = 50.4 per cent.	58 = 49.6 per cent.
	Total after deducting 1, 7, and 8.	85	56 = 65.9 per cent.	29 = 34.1 per cent.

In two or three of these cases there was observed multiple enlargement of lymphatic nodules ; about the same number developed goitre; and in another case morbus basedowii occurred. These changes have been observed so rarely that they need not be taken into account with the operation of splenectomy. The lymphatics have been watched very closely after many operations, and no sign of change discovered. The changes in the blood are much more constant and of much greater value in these cases. There are on record twenty-nine cases of laparo-splenectomy in which investigation of the blood was made after the

operation; nineteen of these are of especial value, because in these an exact record of the condition of the blood was made before the operation.

A diminution of the white blood-corpuscles, and therewith a return to the normal conditions, were observed in two cases. One was in Franzolini's case of doubtful leukæmia, and the other was in a case of Albert's, in which the red blood-corpuscles were so reduced that there was a relative leucocytosis.

Three authors have reported diminution of the number of red blood-corpuscles in patients suffering from malaria. How much this disease in itself, or in connection with the bloody operation, has to do with the changes in the blood cannot be positively determined, because of the small number of cases reported.

Vulpus regards of very great importance the fact that eleven observations showed that after the operation there was a more or less rapid and pronounced increase in the number of leucocytes. In two cases this could not be assigned alone to the splenectomy, for the patients were suffering from leukæmia, which continued to progress,—in one case with very great rapidity. The relation of these blood-changes to the operation corroborates the observations of Zesas, based upon experiments with animals, and showing the relation of the spleen to the formation of the blood. Hereafter every operation should show, by careful examinations of the blood, whether the multiplication of leucocytes is invariably the rule or is simply a coincidence in these cases.

The following is Vulpus's table of the cases of laparosplenectomy in which an examination of the blood has been reported, showing the ratio between white and red cells:

CASE.	BEFORE OPERATION.	AFTER OPERATION.
1. Leukæmia	1 : 74	Normal after three months.
2. Leukæmia	1 : 105	1 : 50 after six months.
3. Leukæmia	. . . . .	1 : 7, 1 : 5, 1 : 3 thirteen days after the operation.
4. Wandering spleen	Normal	Normal.

CASE.	BEFORE OPERATION.	AFTER OPERATION.
5. Wandering spleen	1,700,000 red; 26,000 white: ratio 1 : 65	Three weeks after operation, 3,600,000 red; 12,000 white: ratio 1 : 300.
6. Wandering spleen	1 : 400	1 : 160.
7. Wandering spleen	Normal	Normal.
8. Wandering spleen	1 : 240	Two months after operation, 1 : 240.
9. Wandering spleen	1 : 250	Soon after operation, 1 : 150.
10. Wandering spleen	Normal	Normal.
11. Wandering spleen	. . . . .	Increase of white cells, 7 x; rapid improvement.
12. Wandering spleen	. . . . .	Fourteen days after, rapid appearance of leucocytes.
13. Hypertrophy	Normal	Normal.
14. Hypertrophy	1 : 200	Unchanged.
15. Hypertrophy	4,570,000 red 8000 white ratio 1 : 570	Two days after, 1 : 62. Five months after, normal.
16.	1 : 430	1 : 425.
17. Hypertrophy	. . . . .	After six months, slight increase of white corpuscles.
18. Malaria	Normal	Passing diminution of red corpuscles.
19. Malaria	Normal	Normal.
20. Malaria	Normal	Normal.
21. Malaria	1 : 400	Unchanged.
22. Malaria	. . . . .	Passing diminution of red corpuscles.
23. Malaria	. . . . .	Passing diminution of red corpuscles.
24. Necrosis	. . . . .	After three weeks, 1 : 60. After four months, normal.
25. Echinococcus	Normal	Normal.
26. Cyst	. . . . .	After some weeks, 1 : 200; white increased, red diminished. After two years, slight increase of white.
27. Cyst	. . . . .	After eight days, increase of white. After two months, 1 : 3 or 4. After four and a half months, normal.
28. Sarcoma	1 : 500	After six weeks, red diminished, white increased; ratio 1 : 100.
29. Sarcoma	. . . . .	Normal.

From these figures it may be concluded that the leukæmic spleen is not to be extirpated; that the operation has little possible chance of doing any good; and even if the patient survives, the disease is apt to continue even with increased severity.

So much, then, for the surgery of the spleen. As a result of these observations, Vulpius has been able to draw some conclusions as to the physiology of that organ, and these he embodies in some general observations upon the subject.

It was Vesalius who first regarded the spleen as a blood-forming organ, and this opinion has been shared, with certain modifications, by all physiologists.

To Virchow is due the credit of first discovering the disease of leukæmia and showing its relation to the spleen, and thereby demonstrating the physiological relation between the spleen and the blood. He believed that the white blood-cells can become converted into red cells, but whether this change takes place in the spleen he does not presume to say.

Funke believes that this transformation takes place in the spleen. Kölliker has observed in the pulp of the spleen of young animals numerous mononuclear small cells of such a yellow color that they could scarcely be distinguished from red blood-cells. Freyer is of the opinion that red blood-cells originate in the spleen.

Lolwit has discovered erythroblasts, non-hæmoglobic blood-cells, in large numbers in the spleen, where he believes they become transformed into nucleated red blood-cells.

Microscopic study of the spleen shows also that it is the seat of regressive metamorphosis. Mosler has called attention to masses of red blood-cells which were evidently in a state of degeneration. Virchow discovered large cells containing blood-corpuscles which tended to degeneration and to undergo fatty changes. Kölliker often found these in the spleen and also in the blood. They are large nucleated structureless cells which are possessed of amœboid movements and enclose the degenerated cells. Gerlach and Schaffner regarded these as mother-cells of the red corpuscles. This was shown

to be false by Kusnezoff and Gaddi, who isolated the cells from the splenic pulp and observed their phagocytic action upon the warmed microscopic stage. The liberated pigment matter from red cells could be disposed of by being converted into new cells or by being cast off from the body. Perhaps the pale color of the bile and fæces in splenectomized animals is due to the discontinuation of pigment-formation in the spleen. Chemical examination of the spleen shows it to contain an excess of iron, and the results of retrogressive metamorphosis in the form of such albuminous bodies as leucin, tyrosin, etc., are also present.

A further source of information is the study of the blood, microscopically and chemically, before and after its passage through the organ. Though this may seem to be very valuable and important, it is with difficulty carried out to its full extent. Flüggé has thus examined the blood of the hepatic veins and artery and portal vein to discover in this manner the function of the liver, and has concluded that a comparative examination of the afferent and efferent blood cannot reveal the function of the liver or any other organ.

Notwithstanding this radical view, many careful observations of this character have been made, which Vulpian thinks must have some value. The first investigations in this line were those of Wiss (1847) and Béclard (1848), who analyzed the blood of the jugular vein and mixed blood from the *venæ mesaraicæ* and *lienalis*, and found comparatively less blood-cell substance in the splenic vein.

Tarchanoff and Swaen found the splenic veins poorer in white blood-cells than the arteries. Otto has shown that in venous blood there is a larger amount of cellular elements than in arterial blood; as especially is this the case in chronic congestion.

Schwartz has concluded that the colorless blood-cells have a degenerating as well as regenerating effect upon the hæmoglobin. Glass has also found that blood pigment is both destroyed and formed in the spleen.

Many similar observations have been made, but always with more or less discrepancy of conclusion. From these observations it

would seem that the white elements in the veins are sometimes increased, sometimes diminished; and the percentage of hæmoglobin also fluctuates above and below the normal. Evidently the spleen performs the two functions,—the production and destruction of hæmoglobin.

Neumann's experiments failed to show any increase in the activity of the function of the spleen after loss of blood. On the other hand, Bizzozero and Salvioli obtained a very different result. They observed that in dogs and guinea-pigs venesection was followed by a considerable swelling of the spleen, and the appearance of numerous nucleated red blood-cells in the parenchyma and in the marrow of the bones, while these young forms were very rarely to be found in the circulating blood. These observers concluded that the spleen of adult mammals has a reparative function in acute anæmia.

Foa rendered dogs and guinea-pigs anæmic by venesection, and found that the spleen became swollen, the pulp red and soft and rich in nucleated red blood-corpuscles. He made the observations in the human subject that a man and a woman who had died from carcinomatous cachexia contained spleens which were swollen and contained nucleated red blood-cells, which were not found in the intravascular blood.

Braunschweig, Freiberg, and Eliasberg have found that venesection in cats is followed by a rapid swelling of the spleen.

Mya, Popoff, and Eliasberg have found these changes in the spleen when the hæmoglobin of the blood has been disintegrated by poisonous substances.

Assolante, in 1801, made the observation that the blood of splenectomized animals was especially watery, though Bardeleben was not able to discover any blood-changes in dogs thus treated. Schiff also disputed that the spleen had anything to do with the number of red or white corpuscles.

Simon and Heger experimented upon cats, and found in one case no pronounced change in the blood three weeks after extirpation of the spleen. In a second case, however, there was a considerable

increase of white cells at the end of eight weeks. Virchow's observations corresponded with this latter report. Mosler found the same blood-changes in a number of dogs experimented upon.

Schindeler and Maggiorani concluded from their studies that extirpation of the spleen caused the blood to become of less specific weight, to contain a smaller amount of fibrin and albumen, less blood-coloring matter and less iron.

Malassez found that in a splenectomized dog the number of blood-cells and the percentage of hæmoglobin diminished during the first days, but after a month the percentage increased to above the normal.

Tizzoni observed a diminution of the hæmoglobin in dogs after extirpation of the spleen, which in the case of young animals quickly returned to the normal percentage. In older dogs a much longer time was required for this change.

Experiments were made by Pouchet on all sorts of animals,—turbots, doves, puppies, and cats,—and no physiological connection between the spleen and the blood was found.

The investigations made during the last decade are of much more value than all of these previous observations. Winogradoff has had the opportunity of observing three splenectomized dogs for a long period of time. He observed a diminution of the number of red blood-cells and of the hæmoglobin, and an increase of the colorless cells in two cases; in a third case the number of white cells was increased. Tauber found a diminution of red cells and an invariably present increase in the number of white cells in his experiments upon various animals. Zesas kept rabbits alive for a considerable length of time after extirpation of the spleen and made frequent observations of the blood. Four weeks after the operation the red cells had decidedly diminished in number, and were of a darker color than normal. The white cells had increased in number and were larger in size than normal. This increase of the latter continued till the tenth week, at which time the blood was poor in red cells and richest in white corpuscles. A diminution in the number of white cells then began,

which continued to progress, though much more slowly than the increase had advanced. Not till the end of six months was the blood again normal. Zesas concluded that the white cells were converted into red cells in the spleen, though he did not claim that the spleen was the only organ in which this change took place.

Grigorescu reached the same conclusion. He found that three hours after a meal the blood showed 5,970,000 red cells to 7000 white cells. At the same time and under the same circumstances the splenectomized animal's blood showed 5,465,000 red to 29,000 white cells to the cubic millimetre, a diminution of 1 : 654 to 1 : 225.

Vulpus has called attention to the fact that when the spleen is congested, either by natural or artificial means, the blood is then found to contain the maximum number of red cells and the minimum of white. This, with the above experiments, gives ground for the hypothesis that the spleen is a blood-forming organ, and that in this organ the white cells are transformed into red.

The following figures show the number of erythrocytes in the blood of the rabbit. Malassez found respectively 4,300,000, 4,540,000, and 4,160,000; Stölzing, 4,866,000; and Hühnerfauth, 5,385,000, 7,206,000, and 5,304,000. The average of these figures corresponds with the figures of Otto, 5,100,000. The number of colorless corpuscles in the vena jugularis of the rabbit Hühnerfauth found in three different observations to be 8100, 8700, and 18,600 respectively,—average, 11,800. Malassez counted 18,000,000 red cells to the cubic millimetre of goat's blood. Landois found a few more than half this number in the blood of the kid.

With these as control figures at hand, Vulpus made a series of observations upon these animals. He found that in the blood of a year-old rabbit the red cells varied between 4,200,000 and 6,500,000, which corresponds with the above figures. His estimation of the white cells corresponded also with the above figures. This number he found to fluctuate between 7200 and 15,400, or an average of 11,400, white to red,—1 : 450. The blood of a six-months old goat showed 16,000,000 and 20,000,000 of red cells per cubic millimetre,

or an average of 18,000,000; and 15,000 to 30,000 white cells, or an average of 23,500,—ratio of white to red 1:800.

Animals were then operated upon whose blood had been carefully examined. The operations upon the rabbits were performed without narcosis, those upon goats were done under the influence of ether. Most of the animals thus operated upon made good recoveries. Several of the rabbits died of tuberculosis one to three weeks after the operation. Cheesy foci were found in many organs and at the seat of the ligature of the pedicle.

The following is a table of the observations made by Vulpius upon the animals upon which he operated:

RABBIT 1.

- August 21, 1893. Blood: 5,050,000 red, 13,000 white.
 24, 1893. Laparosplenectomy without loss of blood.
 28, 1893. Animal quite lively. Blood: 4,700,000 red, 22,300 white.
 29, 1893. Blood: 4,730,000 red, 22,000 white.
 September 1, 1893. Animal decidedly sick.
 2, 1893. Died at noon. No sign of peritonitis. Tubercular nodules in the liver, and a large tubercular focus at the stump of the pedicle.

RABBIT 2.

- August 22, 1893. Blood: 5,300,000 red, 11,800 white.
 24, 1893. Laparosplenectomy without loss of blood.
 25, 1893. Animal very lively. Blood: 4,800,000 red, 12,300 white.
 September 14, 1893. Blood: 4,800,000 red, 22,400 white.
 October 3, 1893. " 5,000,000 " 21,500 "
 7, 1893. " 5,200,000 " 21,500 "
 26, 1893. " 5,150,000 " 16,000 "

The animal continued to survive in perfect health.

RABBIT 3.

- August 25, 1893. Blood: 5,110,000 red, 13,200 white.
 26, 1893. Laparosplenectomy without loss of blood.
 27, 1893. Animal very lively.
 30, 1893. " lazy.
 31, 1893. Died at noon. The blood from the heart showed 4,730,000 red, 18,830 white.

RABBIT 4.

- August 23, 1893. Blood: 5,250,000 red, 9,700 white.
 25, 1893. " 5,170,000 " 12,300 "
 26, 1893. Laparosplenectomy without loss of blood. Within a few hours the animal was well and lively.
 September 14, 1893. Blood: 4,800,000 red, 23,800 white.
 October 15, 1893. " 5,300,000 " 18,400 "
 30, 1893. " 5,200,000 " 12,300 "

The animal continued to live in perfect health.

RABBIT 5.

- August 23, 1893. Blood: 4,900,000 red, 10,500 white.
 26, 1893. Laparosplenectomy without loss of blood.
 28, 1893. Blood: 4,600,000 red, 13,000 white.
 September 4, 1893. " 4,200,000 " 21,000 "
 15, 1893. Animal died. No autopsy.

GOAT (weight 9.5 kilogrammes).

- August 21, 1893. Blood: 19,100,000 red, 22,500 white.
 26, 1893. Laparosplenectomy. The spleen contained 50 grains of blood. The animal recovered rapidly from the operation.
 28, 1893. Animal perfectly well.
 September 7, 1893. Blood: 16,000,000 red, 33,200 white.
 7, 1893. " 18,000,000 " 36,000 "
 25, 1893. " 18,800,000 " 31,000 "
 October 13, 1893. " 18,200,000 " 21,500 "
 14, 1893. " 18,000,000 " 24,600 "
 28, 1893. " 19,000,000 " 24,000 "

A combination of the results obtained in the various experiments upon rabbits gives a curve which shows a rapid increase of more than 100 per cent. in the leucocytes within nineteen days after the operation. From this high point the curve gradually sinks till it reaches the normal average on the sixty-fifth day. This curve corresponds with the observations of Zesas,—a rapid increase in leucocytes, and a gradual decline after splenectomy.

The same changes took place in the blood of the goat. The number of leucocytes rapidly increased till on the twelfth day it had

arisen 30 per cent. From this point it gradually declined to a sub-normal point on the forty-eighth day, from which it immediately arose to normal, and continued in that line.

The diminution in the number of red cells was not so marked. During the first few days it sank to 80 per cent. of the normal number. This occurred, in the case of the goat, by the second day; and with the rabbits, by the ninth day. From these minimum points it gradually increased, reaching normal on the thirtieth or fortieth day, and going slightly above normal during the few following days.

From these experiments Vulpius concluded that rabbits and goats bore extirpation of the spleen well; that an absolute leucocytosis which reached a degree in which the white cells were doubled in number, the number of red cells diminished not more than 20 per cent., and that both of these changes subsided to normal.

These experiments upon animals are chiefly of physiological importance, and have a practical bearing upon those cases in which the human spleen has to be extirpated for traumatism. Unfortunately, no record of blood analysis is accessible in these cases which have thus far been operated upon. In the other cases of human laparosplenectomy neither the general system nor the spleen of the patient was in a normal condition, and so cannot be compared with these animal experiments. This condition was nearest approached in a case of cystic spleen in which the blood-cell ratio sank to 1 : 200 after operation, due to an increase of white and a diminution of red cells.

Of especial interest is Cr  d  's case, of a patient who, after the operation, became very pallid and feeble, and four weeks later was scarcely able to walk. One week after the operation there was a very evident increase of white and diminution of red cells in the blood. This change reached its maximum after two months, when the ratio was 1 : 3.5. Four and one-half months later the blood had become normal.

Czerny's case, operated upon for necrosis of the spleen, and Requer's case, of rupture of the spleen, cannot be introduced here, because of the changes in the blood due to the traumatic an  mia.

It may be remarked, however, that after these patients had recovered from their anaemia, there still existed an increase of white cells, which in the first case disappeared after four months, but which in the second case was still present at the end of seven months.

The cases of wandering spleen have little physiological value, because the so-called idiopathic wandering spleen is a thing of the greatest rarity, and is usually caused by hypertrophy. In three cases no blood-changes were found, but in two cases there was an increase of white cells. One of these latter had a blood-cell ratio of 1 : 160, the other 1 : 7.

Leucocytosis, which had existed before the operation, was observed in two other cases after operation. In Linfors's case, it continued to progress; but in Turetta's case it remained stationary.

After the extirpation of simple hypertrophic spleens much the same results have been obtained. In two cases increase of white cells was observed. In one of these cases (Péan) the ratio became 1 : 200; in the other (Czerny case) 1 : 62, without any evident change in this number of erythrocytes. The return to a normal condition took five months. In a case of Burkhardt's an excess of white cells, which existed before, was unchanged by the operation.

Examinations of the blood after the removal of three malarial spleens were negative. There were slight changes in three other cases, in one of which the number of red cells was diminished.

A case of lymphosarcoma, from which Kocher removed the spleen, showed a diminution in the number of red cells six weeks after the operation, and an increase in the number of white cells. Fritch observed no change in the blood of a similar case.

These differences in observations must have some physiological cause, and Vulpis has sought for it in the vicarious assumption of the function of the spleen by other organs. There must be some tissue in the body capable of performing the function of the spleen, or else there must be a new development of spleen-tissue after the extirpation of that organ, or an hypertrophy of some remaining splenic tissue. Peyrani refuted this last hypothesis by partially removing the spleen

of a guinea-pig. The remaining portion did not become hypertrophied.

As there is no splenic development after the total removal of the human spleen, the vicarious hypertrophy of an accessory spleen may be considered. Such organs have been found not only in animals, especially in dogs, but are frequently met with in the human subject. When present, they have been found one or more within the ligamentum gastrolienale. They are of a roundish form, without a hilus, and the size of a bean or hazelnut, or larger.

Rosenmüller saw among 400 cadavers in North Germany one accessory spleen the size of a walnut. In Southern Europe he found this anomaly in five out of eighty cases.

Giesker confirmed the observation of Dupuytren, that this condition is common in young persons, and especially in fœtuses.

It is, therefore, very probable that these accessory organs can assume the function of the extirpated spleen. Unfortunately, the opportunity has never been afforded of making an autopsy upon a person who had survived the operation of splenectomy.

The appearance of secondary splenic nodules has been repeatedly observed and described as early as by Malpighi, and later by Meyer, 1842, who claimed that the new organ could reach the size of the normal spleen. Tizzoni saw among a large number of splenectomized animals a formation of numerous nodules upon the omentum, which had the appearance of splenic tissue. Kostjurin saw nodules the size of beans scattered over the greater omentum which had the structure of splenic tissue. Griffini saw the same thing also in a case of hypertrophy of the spleen. Eternod saw a splenic nodule on the omentum of a young fox, but no accessory spleen was present.

Mosler has made microscopic examinations of such tumors found in a dog whose spleen had been removed, and found what he called "hæmorrhagic teleangiectatic lymphoma,"—that is, a tumor having the gross appearances of splenic structure, but under the microscope being something quite different.

None of these observations having been made in man, the thy-

roid gland, the lymph-nodules, and the bone-marrow have been looked to as performing the function of the extirpated spleen.

Bardeleben has simultaneously removed the thyroid and spleen from dogs and cats, always with fatal results. A dog in which he did the operation in two stages recovered. Zesas made the same experiments, and regarded the thyroid as the most important associate organ to the spleen. Tauber was able to save animals with both organs extirpated simultaneously or at two sittings, and claimed that in ten out of every fifteen animals upon which he operated the thyroid was either missing or of insignificant size. Ughetti and Mattei showed that rabbits survived extirpation of both spleen and thyroid.

In the case of the human subject it is well known that the thyroid cannot be removed without causing very great harm.

Hyperplasia of the thyroid following splenectomy has been observed in only three cases. Credé noticed a painful swelling of the whole thyroid four weeks after the operation, which lasted in a milder degree for four months. As the marked leucocytosis subsided the gland also improved. A woman operated upon by Lählein developed a small, painful tumor of the thyroid, twelve days after the operation, which did not reach the size of an egg. Ceci has also reported a similar case.

The rarity of this complication, its timely subsidence, and the result of experiments upon animals would tend to preclude the hypothesis that the thyroid and the spleen have the same function. These rare instances of swelling of the gland may be accounted for upon the ground of congestion or blood-changes.

Swelling of the mesenteric and retroperitoneal lymph-nodules has been repeatedly observed in animals whose spleens have been cut out.

Pouchet has removed the spleen from animals which have no lymph-nodules, tritons, for example, without causing the death of the animal.

Zesas found at the autopsy on spleenless rabbits swelling of the

bronchial and mesenteric lymphatics. These enlargements were noticeable one week after the operation, were pronounced after four to seventeen weeks, and at the end of six months had quite disappeared.

Winogradoff, Tizzoni, and Gibson examined these enlarged nodules found in spleenless animals, and found in the distended lymph-spaces between the follicles and follicular septa and in the peripheral sinuses, nucleated red blood-cells, just as in the bone-marrow.

In none of the animals operated upon by Vulpinus was there any enlargement of lymph-nodules, neither in the animals which died soon after the operation nor in those which were killed at the end of five months.

Diffuse enlargement of lymphatics has been observed in man after the operation. Czerny saw these changes during convalescence in a woman operated upon for wandering spleen two weeks after the operation of the inguinal and cervical glands, which swelling disappeared after three months. In this case no blood-changes were discovered as a result of the operation. A case operated upon by Kocher for sarcoma showed an enlargement of the lymph-glands simultaneous with a leucocytosis. Lennander observed enlarged lymphatics some time after the operation. The enlargement was but slight, and could not be associated with the operation. Finally, Riegner has reported a case of extensive lymphatic enlargement which appeared in the groin four weeks after the removal of a ruptured spleen, extended over the whole body, and did not disappear till after seven months.

On the other hand, a large number of cases was associated with no such complication.

Pouchet has shown that fish, which have no bone-marrow, do not suffer from removal of the spleen.

Mosler found in a dog, ten months after splenectomy, that the bone-marrow was red and dense, as it is in leukæmia, whereas six weeks after operation it had been normal. Similar observations were

made by Tizzoni, Winogradoff, Kostjurin, and Freiberg, who regarded the change as due to functional hyperæmia, and increased activity of the marrow in the sense of red blood-cell formation by the division of the nucleated red formative cells.

There has been scarcely any study of the bone-marrow made after extirpation of the human spleen. Patients have complained of pain in the extremities, which has been attributed to changes going on in the marrow of the long bones.

Riegner made an autopsy four weeks after removal of a ruptured spleen. The patient had lost much blood, and the changes discovered in the marrow had no very valuable significance.

If it is a fact that the spleen is one of the blood-forming organs, the removal of this organ associated with excessive hæmorrhage must cause a very great disturbance to the general system. When this does not result, it must be presumed that there are associate organs which take on an increased activity. If this last does not occur to a high degree in animals possessing spleens, and which have been rendered artificially anæmic, the hæmatopoietic function of the spleen is questionable.

Exact investigations in this line are not numerous. Malassez and Pouchet saw that the blood after venesection was the same in animals with as in those without spleens. Korn experimented upon sound and miltless pigeons. Four weeks after the splenectomy he bled these birds to prove whether there was any difference in their resisting powers as compared with the sound birds. He was not able to distinguish any difference.

On the other hand, Eliasberg, Grünberg, and Freiberg observed enlargement and redness of the lymphatics, reddening of the bone-marrow, richness of the same in nucleated red blood-cells when, in addition to extirpation of the spleen, a venesection was done.

Be these observations of as much importance as they will, the facts stand that patients whose spleens had been removed have been reduced to an extreme degree of anæmia and made a good recovery.

One of Czerny's patients lost much blood, so that the number

of red cells was reduced 33 per cent. The loss of blood was about 2.5 per cent. of the body weight, and at the end of two months the blood had not yet reached its normal state.

Hühnerfauth, Lyon, and Maydl have found that in healthy men and animals a loss of blood equal to 3 to 4 per cent. of the body-weight is restored in thirty days.

Vulpus has arrived at the following general conclusions concerning the physiology of the spleen :

(1) Histological study of the normal splenic tissue shows the possibility but not the certainty of the entrance of colorless cells in the circulation from the spleen. It is evident that the red cells undergo disintegration in the spleen, but there is no ground for assuming that they are formed in the spleen.

(2) Comparison of the blood of the splenic artery and vein shows no positive difference.

(3) In acute general anæmia the spleen shows signs of increased activity.

(4) Removal of the spleen causes a transient decrease in the number of red, and increase in the number of white, blood-cells.

(5) The thyroid gland has no vicarious relation to the spleen.

(6) The lymph-nodules and the bone-marrow acquire an increased blood-forming activity after extirpation of the spleen.

(7) The regeneration of blood is retarded after hæmorrhage in persons without spleens.

These conclusions, though contradicting certain accepted teachings, offer little that is new, but are of value in that they are based upon accurate scientific data, and corroborate much that has already been done. Unfortunately, our knowledge of the physiology of the spleen is still left in a state of confusion.

The surgery of that organ is on a more established basis. We know that in the treatment of the operable splenic tumors the ordinary surgical and mechanical principles come into play. In the case of the leukæmic tumor, at least, this is not the case. Here we have to deal with a tumor which is but an incidental complication of a

fatal general disease. Something more than the mechanics of surgery must be brought to bear in this case. This is not for those gentlemen to treat who, in the fulness of their operative zeal, would extirpate whatever abdominal tumor is removable. The examination of the blood and a study of statistics are matters of prime importance.

JAMES P. WARBASSE.

INDEX TO SURGICAL PROGRESS.

OPERATIVE SURGERY.

An Operation for the Cure of Cleft of the Hard and Soft Palate. By Mr. N. DAVIES-COLLEY (London). The following method of closing clefts of the hard and soft palate was devised by him nearly a year ago, and was a modification and extension of an operation for closing clefts of the hard palate published by him more than three years ago. The operation might be divided into three

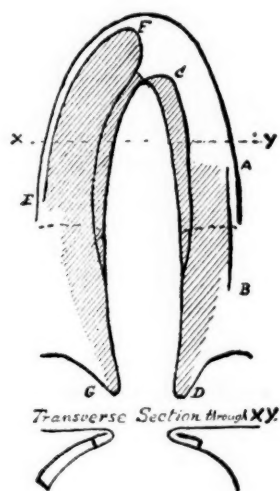


FIG. 1.

stages:—(a) An incision, A B, (FIG. 1,) is made down to the hard palate in front, and behind through the soft palate, with its centre just internal to the last molar. With a raspatory, the muco-periosteum is separated from A B inward. (b) An incision, C D, is made about a quarter of an inch from the cleft in front. It runs parallel to the

cleft backward, and is continued to the tip of the uvula, splitting the soft palate to the depth of about three-eighths of an inch in front, and a less amount behind. The muco-periosteum between *c d* and the cleft of the hard palate is separated inward with the raspatory as far as the edge of the bone. (*c*) A triangular flap, *E F G*, is raised from the other side of the palate in such a way that the anterior extremity is free, and the inner margin runs parallel to the edge of the cleft at a distance of one-sixth of an inch. In the soft palate the incision is continued backward so as to split that structure in the

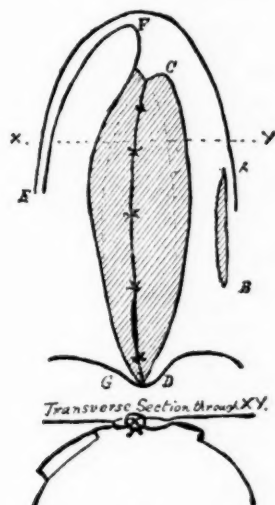


FIG. 2.

same way as on the other side. The muco-periosteum of the hard palate internal to *F G* is separated inward and left attached to the edge of the bone. The mesial flaps—namely, those internal to *c d* and *F G*—are united by fine silk or catgut sutures; and continuously with this union the upper planes of the split soft palate are brought together. FIG. 2.—A bridge is thus formed across the whole cleft, with a mucous surface directed upward and a raw surface downward. The edge, *F G*, of the triangular flap in front and of the lower plane of the soft palate behind is united by silver wires, and one or two silk sutures to the edge, *c d*, of the hard and soft palate of the

other side. FIG. 3.—A second bridge is thus formed across the whole cleft, with a raw surface looking upward and a mucous surface downward. The after-treatment was that of the ordinary operation, except that, as there was no tension in the hard palate and very little in the soft, the sutures might be left in from three to six weeks. The advantages claimed for this operation were: (1) No tissue has to be pared away. (2) A much larger extent of raw surface is brought into close contact than in the ordinary operation. (3) The tension is small. (4) The upward pressure of the tongue is beneficial, as it

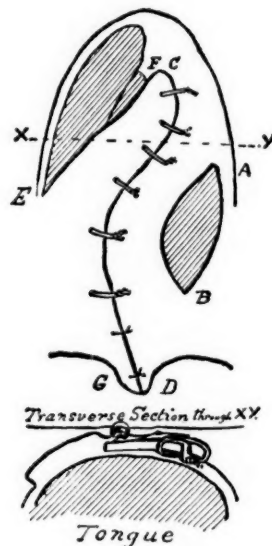


FIG. 3.

presses the lower against the upper bridge. (5) Some advantage is gained by using the muco-periosteum of one side in front of the cleft to help in bridging the gap of the hard palate. The only drawback to the operation was that the application of so many sutures made it rather longer than the ordinary operation. In each of the six cases upon which he had employed this method union had been complete over at least four-fifths of the cleft.—*British Medical Journal*, April 28, 1894.

HEAD AND NECK.

The After-Treatment of Tongue-Excisions. By HENRY T. BUTLIN, F.R.C.S. (London). The after-treatment of operations on the tongue should be chiefly directed to: (1) maintaining the wound in the mouth as aseptic as possible; (2) diminishing the tendency of the wound-discharges to pass down the air-passages; (3) preventing food from passing down the trachea into the lungs.

The first indication is best fulfilled by the frequent use of powdered iodoform to the mouth wound. As soon as the operation is over, and before the patient is put back to bed, the surface of the fresh wound is dusted with powdered iodoform. And, for a week or ten days, iodoform is blown on to the surface of the wound by means of a proper insufflator. In addition, the patient may use a mouth-wash of Condy's fluid or weak carbolic solution to help to cleanse the interior of the mouth of the fluids which collect there.

The second indication requires that the patient's head should be kept low, and that he should lie on one side. Butlin only allows one small pillow, and insists that he should lie well over on the side from which the greatest amount of tongue has been removed. The discharges then have a tendency to sink into the cheek, and are frequently washed out or allowed to run out, and there is thus the least possible inclination of discharges to sink down towards the back of the mouth and larynx.

The feeding of these patients needs very great attention. When only half of the tongue—whether a lateral half or the front half—or two-thirds has been removed, liquids can generally easily be taken on the day following the operation from a feeder with a spout, provided a piece of India-rubber tubing, three or four inches long, be fixed on to the spout. If the right half of the tongue has been removed, the patient should lie over on the left side during feeding, so that the food is kept as far as possible away from the wound, and passes over the parts which have been least interfered with.

When the whole of the tongue has been removed, the difficulty of swallowing is much greater, and many days may elapse before the

patient acquires the knack of swallowing liquids without permitting a small quantity to pass down the air-tubes. During the first forty-eight hours these patients are fed through the rectum with nutrient enemata. At the end of that period the patient may make a first attempt to swallow a little liquid, and water should be chosen for the experiment, because the entrance of a little water into the trachea is seldom followed by any serious consequences. Milk and beef-tea are more dangerous; they hang about the air-tubes, are difficult to get rid of, and are very prone to undergo rapid decomposition, and occasion the much-dreaded swallowing pneumonia (*Schluck-pneumonie*). If the experiment is successful, other liquids may be tried, and the problem of feeding is really overcome. But if there is any difficulty, the patient, as long as may be necessary, should be fed through a tube. No instrument is so good for this purpose as a black bulbous catheter, about No. 9 or 10, attached to a long piece of India-rubber tubing, to the other end of which a small glass funnel is fixed.

The throat is first sprayed with a 3 or 4 per cent. solution of cocaine; the tubing is clamped with forceps just above the attachment of the catheter, and the funnel and tubing are filled down to the clamp forceps with warm food. The catheter is very gently passed down the pharynx, and hitches at the posterior border of the larynx. The patient is directed to swallow, and as he does so the catheter is easily passed on into the œsophagus. For the moment discomfort is created, and the patient often struggles. He is directed to close his mouth, and no attempt is made to pass the catheter farther down for half a minute or longer. Then it is slowly and gently passed down to a distance of about eleven inches from the teeth. When the annoyance of the presence of the catheter has ceased, the clamp is removed and the food is allowed to run slowly down into the stomach. If there is an inclination to regurgitation or to cough, the descent of liquid is instantly arrested by pressing on the tubing with the finger and thumb, and the nurse lowers the funnel until the dangerous moment has passed. By attention to these details, a pint or a pint and a half of liquid may easily be introduced into the

stomach without danger. Before removing the catheter the funnel is raised high up, so as to get rid of the contents of the tube; and during the actual removal of the catheter the tubing is kept tightly pressed between the finger and thumb in order to prevent the entrance of even a few drops into the larynx. Patients are often so satisfied with this method of feeding that they have sometimes insisted on being fed through a tube for a much longer period than was really necessary.

Results.—The reporter has removed at least half the tongue in forty-six consecutive cases, with one fatal result. The great majority of the operations were, of course, uncomplicated,—that is, they were not complicated by the removal of lymphatic glands or of ligature of the lingual artery. But they were performed on persons varying in age from thirty-three to seventy-five years, and nineteen of them were performed on patients over sixty years of age. Some of the patients were suffering from organic disease of internal organs, and some of the operations were very severe. They may be thus classified:

(1) Uncomplicated operations, 30; removal of one lateral half of the tongue, 13; removal of anterior half or two-thirds, 12 (in several of these the floor of the mouth was at the same time freely dealt with); removal of the whole tongue, 5.

These uncomplicated operations were recovered from in almost every instance without any drawback.

One patient, forty-six years old, had an attack of secondary hæmorrhage from the right lingual artery eleven days after the removal of the whole tongue. An anæsthetic was administered and the artery tied in the floor of the mouth, after which he made a steady recovery.

In an old man, aged seventy-two, severe bleeding took place on the day of the operation, not from the tongue, but apparently from the back of the throat. After some time the hæmorrhage ceased, and he slowly recovered, but his recovery was seriously retarded by the loss of blood.

(2) Complicated operations, 16: removal of half of the tongue

and lymphatic glands, 2; removal of the whole of the tongue and lymphatic glands, 1; removal of half of the tongue, ligature of the lingual artery in the neck, removal of glands, etc., 10; removal of the whole tongue, ligature of the lingual artery in the neck, etc., 3.

These complicated operations were for the most part recovered from with greater difficulty than the uncomplicated operations. Infiltration took place from the wound in the mouth into the deeper wound in several of them, and in one case in which this occurred the patient was for two or three weeks seriously ill. Since then Butlin has almost invariably drained the lower wound for the first few days after the operation, a precaution which he had seldom previously taken.

In one of these patients, fifty-one years old, hæmorrhage occurred six days after the operation from a deep cavity which had been made in the floor of the mouth, and recurred during three or four days. It was ultimately arrested by thoroughly clearing out the wound to the bottom and plugging it with iodoform gauze. And in a man, aged forty-nine, secondary hæmorrhage set in from the wound in the neck nine days after the operation. The hæmorrhage was arrested also by plugging, and the patient slowly recovered.

The fatal case was that of a man, aged seventy-one, who suffered from an epithelioma of the anterior portion of the left half of the tongue, and associated enlarged glands. Butlin removed the left half of the tongue, the enlarged glands, and tied the lingual artery in the neck. In the course of a day or two the wound in the neck was foul, apparently from the sinking down of discharges into it from the mouth; it had not been drained. The patient had rigors and high temperature. He appeared to improve for a while after the condition of the wound had been bettered, but he finally died five weeks after the operation.—*British Medical Journal*, April 14, 1894.

ABDOMEN.

I. Analysis of Seventy-Eight Cases of Operative Interference with the Gall-Bladder and Bile-Ducts. By A. W.

MAYO ROBSON, F.R.C.S. (Leeds). Among the prominent symptoms and complications of cholelithiasis experienced were :

(1) Spasms or biliary colic without jaundice, the attacks being repeated at longer or shorter intervals, coming on without apparent cause, usually starting in the epigastrium or under the right ribs, and radiating to the right scapular region or to the shoulder, and often ending in vomiting, which usually gave relief.

(2) Collapse, due to the intensity of the pain, which he had known to cause death without any other complication.

(3) Spasms followed by evanescent icterus.

(4) Pain followed by persistent jaundice and enlargement of the liver, which may give rise to the suspicion of malignant disease, but which may usually be diagnosed from cancer by the presence of

(5) Attacks of pain accompanied by a feeling of chilliness or a rigor, and followed by increased temperature and then by profuse perspiration, the whole attack resembling one of ague.

(6) Distention (hydrops) of the gall-bladder without jaundice, ordinarily due to impaction of gall-stones in the cystic duct.

(7) If accompanied by persistent jaundice, distention of the gall-bladder raises a suspicion of malignant disease, either of the liver or bile-ducts or of the head of the pancreas.

(8) Ileus due to atony of the bowel, apparently dependent on the pain, producing a profound impression on the nerves of the abdomen, leading to enormous distention, and to the symptoms and appearance of acute intestinal obstruction.

(9) Acute intestinal obstruction dependent on : (a) Paralysis of gut due to local peritonitis in the neighborhood of the gall-bladder. (b) Volvulus of small intestine. (c) Impaction of large gall-stone in some part of the intestine after ulcerating its way from the bile-channels into the bowel.

(10) General hæmorrhages, the result of long-continued jaundice, either dependent on gall-stones alone or on cholelithiasis associated with malignant disease.

(11) Persistent vomiting, with such serious digestive disturbances as to threaten death from exhaustion.

(12) Localized peritonitis producing adhesions, which may then become a source of trouble even after the gall-stones have all been got rid of. He believes that nearly every attack of biliary colic is accompanied by adhesive peritonitis, as his experience is that in all cases where there have been characteristic seizures adhesions are found.

(13) Dilatations of stomach dependent on adhesions around the pylorus.

(14) Ulceration of the bile-passages establishing a fistula between them and the intestine.

(15) Abscess of the liver.

(16) Localized peritoneal abscess.

(17) Abscess in the abdominal walls.

(18) Fistula at the umbilicus or elsewhere on the surface of the abdomen.

(19) Empyema of gall-bladder.

(20) Suppurative cholangitis.

(21) Septicæmia or pyæmia.

(22) Gangrene of the gall-bladder.

(23) Perforative peritonitis due to ulceration or to rupture of the gall-bladder or ducts.

(24) Extravasation of bile into the general peritoneal cavity.

(25) Pyelitis of the right side.

(26) Cancer of the gall-bladder or of the ducts.

(27) Subphrenic abscess.

(28) Empyema on the right side.

(29) Pneumonia of the lower lobe on the right side.

(30) Chronic invalidism and inability to perform any of the ordinary business or social duties.

Cases complicated with malignant disease are decidedly unfavorable ones for operation. First, because the subjects of cancer are not only as a rule cachectic and worn down by disease before the surgeon is called in, and, therefore, unfitted to bear the shock of any operation; but, secondly, because such patients are particularly prone to

hæmorrhage at the time of operation, or, subsequently, which may be uncontrollable.

Too strong emphasis cannot be laid on the fact that operations undertaken on patients with malignant disease of the head of the pancreas, of the bile-ducts, or of the liver, if combined with deep jaundice, are attended with very great risk; and that in such cases the great risk is not compensated for by the slight respite which may be given by establishing a biliary fistula, as recommended by some able surgeons.

In all the cases of malignant disease with jaundice operated on the gall-bladder formed a perceptible tumor, whereas, when the jaundice was dependent on gall-stones there was no marked tumor present.

The indications for operating are as follows:

- (1) In frequently-recurring biliary colic without jaundice, with or without enlargement of the gall-bladder.
- (2) In enlargement of the gall-bladder without jaundice, even if unaccompanied by great pain.
- (3) In persistent jaundice ushered in by pain, and where recurring pains, with or without ague-like paroxysms, render it probable that the cause is gall-stones in the common duct.
- (4) In empyema of the gall-bladder.
- (5) In peritonitis, starting in the right hypochondrium.
- (6) In abscess around the gall-bladder or bile ducts, whether in the liver or under or over it.
- (7) In some cases where, although the gall-stones may have passed, adhesions remain and prove a source of pain and illness.
- (8) In fistula, mucous or biliary.
- (9) In certain cases of jaundice, with distended gall-bladder dependent on some obstruction in the common duct; but in such cases the increased risk must be borne in mind, as malignant disease will probably be the cause of the obstruction.

Supposing the case to prove a suitable one for cholecystotomy, and the gall-bladder and ducts can be cleared without great difficulty

by means of forceps within, and the fingers outside the ducts, the opening in the gall-bladder can be sutured to the aponeurosis, which he thinks preferable to skin-fixation, and drained, which he infinitely prefers to immediate suture of the opening.

But if the ducts cannot be cleared, what may be done?

(a) Cholelithotripsy or crushing of the gall-stones *in situ* by means of the finger and thumb, or by padded forceps, an operation which he has successfully performed on numerous occasions, and which he prefers to the more formidable procedure of incising the ducts, or of fixing the gall-bladder to the intestine.

(b) Choledochotomy, or incising the duct, whether cystic or common, the incision being afterwards sutured, not an easy matter on account of the depth of the parts to be coaptated, but which he has found to be best effected by means of a rectangular cleft palate needle. A drainage-tube should always be inserted into the right kidney-pouch in such cases.

(c) Cholecystenterostomy, or the making of an anastomosis between the gall-bladder and intestine, easily effected if the gall-bladder be dilated, with difficulty performed if the gall-bladder be contracted, as is often the case. He has performed this operation three times, with immediate success and recovery in all, and with complete and permanent relief in two. The method he prefers is that by means of his decalcified bone-bobbin, which enables the operator to accomplish the anastomosis rapidly, as only two sutures have to be employed.

(d) The daily injection of fluids after an interval of some days, through the cholecystotomy opening, which will either soften or dissolve the concretions. For this he has used hot water, a solution of taurocholate of soda, ether, and ether and turpentine, with more or less success; but thinks that an injection of olive oil or a 5-per-cent. solution of *sapo animalis* or oleic acid will be worth more fully trying.

(e) Cholecystectomy may be required as a secondary operation in cases of stricture of the cystic duct, the common duct being free.

On three occasions in which he has excised the gall-bladder, it has been for mucous fistula depending on stricture of the cystic duct following on gall-stones, and all the cases were completely and permanently relieved.

Cholecystectomy can seldom be advisable or necessary as a primary operation in gall-stones, and extremely rarely possible in malignant disease. In cholecystotomy, where it is impossible to bring the margins of the incised gall-bladder into the wound, and where the parietal peritoneum cannot be tucked down to meet the edges of the opening, he has made a tube of the omentum, but in such cases no hesitation need be felt in trusting to a drainage-tube, as the peritoneal cavity soon becomes occluded around the drain, and there is little or no tendency to the passage of bile among the viscera, so that a suprapubic drainage opening is quite unnecessary. With very few exceptions he has found a vertical incision along the upper part of the right linea semilunaris to give ample room, but if required he has not hesitated to get further room by a transverse cut in addition.

Suture of peritoneum, aponeurosis, and skin by separate stitches effectually guard against ventral hernia, if the patient be kept recumbent for from twenty-one to twenty-eight days, and if a firm oval pad be worn under a belt for a few months subsequently.—*Brit. Med. Journ.*, April 28, 1894.

II. New Method of Jejunostomy. By Professor ALBERT (Vienna). During the year 1888 two jejunostomies were performed in Professor Albert's clinic. In the first case the patient lived four weeks after the operation; in the second case the patient died of pneumonia on the fourth day. Maydl has performed the operation once, at which time he did a simple lateral jejunostomy,—sewing the gut into the abdominal wound and opening it. In 1892 he published a new method of performing the operation (*Wiener medicinische Wochenschrift*, Nos. 18 and 19, page 742). The loop of jejunum being drawn out through the abdominal wound was divided transversely. The distal end was then drawn out still farther and an opening made

lower down, into which opening the proximal end of the gut was sutured. By this means the secretions of the pancreas and liver passed on into the intestine. The transverse wound of the distal end was then sewed into the abdominal opening, through which the food could be introduced. A regurgitation of the intestinal contents could not easily occur. He employed this same idea in gastro-enterostomy, the end of the distal segment being implanted in the stomach.

Albert (*Wiener medicinische Wochenschrift*, No. 2, 1894, page 58) reports a method which he has employed more recently, and which seems to him somewhat simpler than the preceding procedure.

The patient was a woman twenty-nine years of age, who had suffered thirteen years before with peritonitis, but otherwise had been healthy. For the last two years she had suffered with stomach trouble, marked by frequent vomiting. For six months she had also complained of pain in the abdomen. She was delicate, anæmic, and weak. A tumor the size of the fist could be felt above the navel. It was placed transversely, was firm, moved up and down with the diaphragm, and was separated from the liver by a tympanitic zone. It was evidently a carcinoma ventriculi of unusual size, the removal of which was out of the question. Because of the extensive involvement of the stomach wall a gastro-enterostomy was also contraindicated, and a jejunostomy was performed. On opening the belly a carcinoma of the pylorus was found extending along the lower curvature to the fundus. A loop of jejunum was drawn out, and the larger part of the abdominal wound temporarily sutured. The gut was not cut across, but an anastomosis was made at the base of the loop between the distal and proximal sections for the transmission of the secretions of the liver and pancreas. Parallel to the first abdominal incision, and four centimetres above it, a second incision two centimetres long was made through the skin. Between these two wounds the skin was undermined so that a bridge of skin was formed. The loop of jejunum was then dragged under this bridge and sutured to the edges of the upper wound. The skin was sutured entirely over

the lower wound, leaving the gut with a skin covering. The anastomosis lay directly behind the peritoneal wound in the abdominal cavity. The distal arm of the loop passed in a direct line from the upper wound beneath the skin and back into the abdomen. When necessary, regurgitation could be prevented by placing a compressing-pad over the skin between the two wounds.

On the fourth day after the operation the intestine was opened with the cautery. The patient was fed with milk, soup, wine, eggs, etc., and discharged at the end of three weeks. Eight weeks after the operation she died. She had continued to feed herself by the fistula and by mouth.

Albert has performed a second such operation. The patient was a woman twenty years of age, who had suffered from contraction of the œsophagus and stomach after swallowing lye about a month before. She was so weak that she perished a few hours after the operation. The autopsy showed extensive ulceration of the stomach and stenosis of the pylorus. Albert is of the opinion that this method is more easily carried out than the operation of Maydl, and will find application especially in such cases as the last.

JAMES P. WARBASE (Brooklyn).

III. A Case of Perforation of a Chronic Ulcer of the Duodenum Successfully Treated by Excision. By HENRY PERCY DEAN, F.R.C.S. (London). A married woman, aged twenty-seven years, was admitted into the London Hospital, February 17, 1894, with intense pain over the whole of the abdomen, perhaps slightly more marked in the epigastric regions: the patient felt very ill, and her expression was exceedingly anxious. Vomiting occurred every few minutes. The pulse was 120, feeble and regular. The respirations were rapid and irregular, both in force and rhythm. The tongue was slightly furred and very dry. There was uniform tenderness over the entire abdomen, the distention was moderate in degree. The temperature was 100.6° F.

For about a fortnight she had suffered from pain in the chest and

pit of stomach. Her bowels had not been opened for seven or eight days. About twenty-four hours before admission to the hospital the patient suddenly became much worse, feeling a severe pain in the pit of the stomach, and a sensation of intense weakness. This was soon followed by vomiting, repeated at frequent intervals.

It was decided to operate at once. The patient was taken to the operating theatre, anæsthetized with chloroform, and an incision about three inches long was made immediately below the umbilicus. On opening the peritoneal cavity a quantity of purulent fluid escaped, and coils of intestine, somewhat distended, intensely congested, and covered in places with flakes of lymph, protruded through the wound. No evidence of any mechanical obstruction appearing, the incision was prolonged upward to the ensiform cartilage. Some flakes of lymph were found in the region of the gall-bladder, and in the centre of one of these flakes some gas bubbles formed a kind of froth. On inserting a probe into the froth it passed into a cavity, which on further examination was found to be the duodenum, the perforation being situated on the anterior aspect about three-quarters of an inch beyond the pylorus. Around the perforation a distinct induration could be felt. By means of scissors this indurated area was excised. The portion removed was elliptical in shape, measuring one and a quarter inches in its long axis, which was parallel with the transverse axis of the gut. The portion excised was found to include the ulcer and a margin of healthy mucous membrane. In the centre of the ulcer was a perforation about two millimetres in diameter. The floor of the ulcer was white, and the edge of the ulcer was bounded by apparently healthy mucous membrane. The elliptical opening thus made into the duodenum was sewn up by silk sutures according to Lembert's method. The peritoneal cavity was washed out with warm, weak, boracic lotion, well sponged, and the wound sewn up by stitches passing through the whole thickness of the abdominal wound. The operation lasted fifty minutes.

After the operation the patient was allowed nothing by the mouth. She was fed solely *per rectum* by nutrient enemata and sup-

positories for seventeen days. To allay thirst, two ounces of warm water were occasionally injected into the rectum. The patient rapidly improved, was given liquid food by the mouth on the eighteenth day, and solid food on the twenty-eighth day. The abdominal wound healed by first intention, and on March 19—that is, thirty days after the operation—the patient was walking about the ward, going into the garden, and eating ordinary food.

At the end of another month, however, she suddenly developed symptoms of obstruction of the bowel, and was subjected to a second abdominal section. The great omentum was found adherent to the wound, and at the lower part of the scar a band could be traced to a coil of intestine, and this band had caused a kink in the gut sufficient to produce complete obstruction. The band was attached to the gut about six inches above its entrance into the cæcum. The coils of intestine on the proximal side of the band were greatly distended and very congested. On the distal side of the band the intestine was collapsed. The band was removed, and immediately afterwards the collapsed coils became distended, showing that the obstruction had been relieved. The peritoneal cavity, which contained some blood-stained fluid, was washed out with warm boracic lotion, and the wound sewn up by silkworm-gut stitches. The operation lasted forty-five minutes.

The patient recovered to a slight extent from the shock of the operation, but never thoroughly rallied. She gradually became weaker, and died about thirty-six hours after the operation.

Post-mortem Examination.—On opening the abdomen a considerable amount of lymph was found upon the intestines, and the peritoneal cavity contained a quantity of turbid fluid. About three inches above the attachment of the band to the small intestine was a perforation from which the intestinal contents escaped. A little higher up was another perforation. On opening the intestine it was found that each perforation was in the centre of a small ulcer. The ulcers were evidently of very acute and recent formation, as the whole thickness of the intestinal wall at these spots was necrosed. There

were several other necrotic patches within eighteen inches of the obstructed point. For about half an inch from the pylorus the duodenum was thinner than normal, and the peritoneum over it was puckered. The duodenum was quite healthy, and presented no traces of past or recent ulceration.—*British Medical Journal*, May 12, 1894.

IV. On Omphalo-Peritonæal Hernia. By Drs. DEMONS and BINAUD. These authors describe a variety of hernia à double sac, characterized by the existence of a diverticular sac between the peritoneum and the posterior layer of the abdominal wall, and communicating with the principal sac of the hernia. This variety of hernia was first described in France by Pelletan (1810) and Parize (1852). It has since been written of in Germany by Frierp, Janzer, and Streubel; and in England by Cock, Birkett, and Hilton. It was not well known, however, until the two important memoirs of Krönlein were published, the first in 1876 (*Archiv für klinischen Chirurgie*, Bd. XIX, p. 408) and the second in 1880 (*Archives générales de Médecine*, Tome II, p. 414).

The cases collected by Krönlein made a total of twenty-four. Twenty-three of these were of the inguino-properitonæal variety, and a single case was of cruro-properitonæal hernia. He had not found any report of this anomaly occurring in connection with umbilical hernia.

The honor of first recognizing a case of omphalo-properitonæal hernia is due to Professor Félix Terrier (*Considérations cliniques sur la hernie ombilicale étranglée*; in *Bulletin et Mém. de la Société de Chirurgie de Paris*, 1881, p. 19). The case was that of a woman, seventy-seven years of age, who had carried a large irreducible umbilical hernia for over twenty years. Symptoms of strangulation developed, and an operation was done on the fifth day. The umbilical sac contained strangulated intestine and omentum; and communicating with this sac was a second independent sac lying behind the abdominal wall and containing deeply congested intestine. The gut was relieved, but the patient died after a few hours.

The second observation of such a case was made by Sanger, of Leipzig, in 1891 (*Zur radical Operation grosser, nicht eingeklemmter Nabelbruche; Centralblatt fur Gynakologie*, XIV, 27, 1890). A tumor, the size of an apple, appeared at the umbilicus of his patient during pregnancy. A second tumor, just beyond the first and three times its size, could be made out by having the patient in the kneeling position. He opened the superficial sac, and excised the contained omentum. Just above this, and lying between the peritoneum and abdominal wall, was a second independent sac, also containing omentum, which the operator excised. The patient recovered.

The third case on record is that of Quenu, published in 1893 (Savariaud, *Bulletin de la Societ anatomique de Paris, seance du trois mars*, 1893, p. 161). This umbilical hernia was observed in a woman forty-seven years of age, and was of two years' standing. The hernia was reducible, but painful at certain points. As it was reduced, the finger-tip passed into the ring, but still seemed unable to press the gut away from the opening, as could be demonstrated by percussion and palpation. Operation for radical cure revealed a very thick sac, communicating with which was a second sac lying just beneath the peritoneum, and it was from this sac that the gut could not be reduced by taxis.

Demons and Binaud report their case, which is the fourth of its kind. The patient, a woman, aged sixty-two, presented herself at the hospital Saint-Andre, suffering from strangulated umbilical hernia. A laparotomy was done twenty-four hours after the onset of the attack. The umbilical sac proper was found to contain a loop of strangulated gut and omentum, and communicating with this sac was a second sac, six centimetres long, lying below the umbilical ring and situated between the peritoneum and the abdominal wall. This sac contained a mass of omentum. The two sacs were dissected out and the patient made a satisfactory recovery.

These four are the only reported cases of omphalo-properitoneal hernia. The location of the diverticulum seems to vary. In one case, it was above the umbilical hernia, in two cases, it was below ;

and the position is not stated in Quénu's case. The diverticulum in Terrier's case extended half-way to the pubes.

Two of the cases were enterocele, and two were epiplocele.

The diagnosis of this condition before operation must be made simply by palpation and percussion, and is not especially difficult in such a case as that of Quénu's, in which the finger passing down through the ring after the reduced hernia feels a herniated loop which cannot be dislodged, and which can be further identified by percussion.

—*Archives provinciale de Chirurgie*, Tome II, No. 12.

JAMES P. WARBASE (Brooklyn).

EXTREMITIES.

The Treatment of Varicose Veins. By Dr. ROBITZSCH (Leipzig). The newest treatment of varicose veins is that invented by Landerer. He has contrived a bandage which is applied to the vena saphena magna in such a way as to have a curative effect upon varicosities in the leg. This apparatus resembles a garter, the inner surface of which is armed with a parabolic spring carrying a cushion filled with water or glycerin. This band is applied below the knee with the pad on the inner side of the leg when the varicosities reach, as is usually the case, only to the knee. This pad is placed directly upon the great saphenous vein, which is prominent at this place. When the disease extends higher the band must be placed above the knee, but the cushion should always lie directly upon the dilated vein. The curve in the spring supporting the cushion prevents any pressure at one or the other sides of the vein; and the band should be so loosely applied that the finger can easily pass beneath it. Great care should be taken not to constrict the whole leg, but only the circulation in the vein should be controlled. In cases in which the disease extends as high as the fovea ovalis, where the saphena empties into the crural, a bandage should be applied, such as is used for crural hernia. It is also recommended to place a linen pad next to the skin, such as is placed beneath a truss; or an elastic band may be applied over the whole dressing.

This method was discussed at the meeting of the German Surgical Congress, in 1891. The method which Trendelenburg employed, it was found, was upon the same principle. He had succeeded in curing and improving varicosities by ligating the saphenous vein. It is the turning of the venous circulation into other channels that he regards as the rationale of this method of treatment. His operation has met with much favor in France, and Cerné has reported a case cured by this method (*Centralblatt für Chirurgie*, September 8, 1892).

The idea which induced Landerer to invent this bandage was that among the first changes which occur in varicose veins is the thinning and disappearance of the valves, as a result of which the entire hydrostatic pressure of the blood column extending from the heart to the capillaries rests upon these vessels of the leg, and gives rise to the dilatation of the veins with its chain of symptoms. If, now, a support for this column is introduced between the periphery and the centre, to take the place of the absent valves, the congestion and tendency to venous dilatation must be favorably influenced. In this way the bandage of Landerer acts much as the operation of Trendelenburg.

The chief thing to be taken into consideration must be the results obtained by this varicosity bandage. One hundred cases have been treated in Landerer's clinic by this new method, and the result has been a most satisfactory one. A number of the patients wore the band for more than two years. About ninety per cent. of the cases were cured of the discomfort due to the varicose veins.

The band is light and easily applied. Perspiration is not hindered. Oedema, pain, and the uncomfortable sensation in the distended veins disappear. Eczema and ulcers heal more rapidly, and even while the patient is about his work. This is of especial importance in cases of ulcers, for, if they heal while the patient is up and about, the healing is apt to be more permanent than when it takes place with the patient in the recumbent position. The band is moreover cheaper than an elastic stocking, and can be worn daily for a year. It is only necessary to renew the glycerin filling every three or four months, or water filling every six weeks.

In most cases, if nothing more than palliation is accomplished, the patient is highly satisfied in comparison with his previous condition.

This simple method of Landerer, because of its conservative nature, can have a more extensive application than the ligation method of Trendelenburg, or the extirpation of the veins as recommended by Schede, Madelung, and Boenneken.—*Deutsche medizinische Wochenschrift*, No. 34, 1893.

JAMES P. WARBASSE (Brooklyn).

FEMALE GENITO-URINARY ORGANS.

Ligation of both Internal Iliac Arteries for Hæmorrhage in Hysterectomy for Carcinoma Uteri. By Dr. H. A. KELLY (Baltimore). The reporter, in the course of an operation through an abdominal incision to remove a carcinomatous uterus, found the broad ligament to be extensively infiltrated. As the result of attempts to tie them off, they proved so friable as to cause the ligatures to cut out, and to allow of such profuse and uncontrollable hæmorrhage that the entire arrest of the direct blood-supply to the pelvis by ligation of the internal iliac arteries was necessitated. Accordingly, the peritoneum over the arteries was incised and ligatures passed around them by a curved aneurism-needle. The operation was then proceeded with without further hæmorrhage. The left ureter was embedded in a carcinomatous mass, but was safely enucleated. An intra-arterial saline infusion, half a litre in amount, was done to overcome the effects of the loss of blood. It was evident that much infiltrated material remained behind in the stumps of the broad ligament at the close of the operation. The patient made a slow but satisfactory recovery. Five months later, after most careful examination by rectum, vagina, and abdomen, not the slightest trace of carcinoma could be detected. A further report of the after-history of this case will be very desirable.—*Johns Hopkins Hospital Bulletin*, April, 1894.

REVIEWS OF BOOKS.

AN AMERICAN TEXT-BOOK OF GYNÆCOLOGY, MEDICAL AND SURGICAL, FOR PRACTITIONERS AND STUDENTS. By HENRY T. BYFORD, M.D., J. M. BALDY, M.D., EDWIN B. CRAGIN, M.D., J. H. ETHERIDGE, M.D., WILLIAM GOODELL, M.D., HOWARD A. KELLY, M.D., FLORIAN KRUG, M.D., E. E. MONTGOMERY, M.D., WILLIAM R. PRYOR, M.D., and GEORGE M. TUTTLE, M.D. Edited by J. M. BALDY, M.D., with 360 illustrations in text and 37 colored and half-tone plates. Philadelphia: W. B. Saunders, 1894. 8vo., pp. 711.

This volume has evidently been prepared to attract the reader not only because of its intrinsic merit, but as well by the clearness and beauty of its typography and illustrations. In fact, the long-primer type and the half-tone plates make it one of the most readable books which we have had the good fortune to peruse. Like its predecessor, "The Text-Book of Surgery," it is the product of many authors, most of whom are well known in the special field of gynæcology. The book, however, has been well edited and the matter carefully compiled. The harmony of its conclusions and the homogeneity of its style give it an individuality which suggests a single rather than a multiple authorship. Following Chapter I, on Examination of the Female Pelvic Organs, we are presented with a chapter on the Technique of Gynæcological Operations. This is not a mere suggestion of technique in general, but a most thorough and detailed statement of the modern technique as applied to the operating-room, the surgeon, assistants, nurses, instruments, ligature and suture materials, and dressings. At the beginning of the chapter the author shows that the evolution of gynæcology to its present high position is due to improvement in the technique of its operations, and

that the one grand underlying principle of modern surgery and the animus of surgical thought is antiseptic technique. Following out this thought, the author gives a most careful and explicit description of the various details of an operation from its beginning to its completion, and the modern methods of asepsis and antisepsis applicable in each case. The text is enforced by illustrations of a complete and modern operating-room, giving a clear idea of the variety and general arrangement of its furniture. We see in this chapter little to criticise and much to commend. We are gratified to find so complete a *résumé* of modern antiseptic technique. The devotion of a separate chapter to this subject is a wise innovation. The innovation will prove an attractive feature.

Menstruation and its anomalies next claim our attention. There is little of special importance in this chapter, save perhaps the discussion regarding menstruation and ovulation, their interdependence, etc. The author acknowledges that this much-mooted question is as yet a subject of speculation, and gives only the status of professional opinion on this subject at the present time, viz.,—

- (1) That ovulation and menstruation are closely associated, but not necessarily interdependent.
- (2) That ovulation may occur without menstruation.
- (3) That conception very often occurs without menstruation.

After a chapter devoted to Anomalies of the Female Generative Organs, General Tuberculosis, and Diseases of the Vulva and Vagina, the Inflammatory Diseases of the Uterus are discussed.

If the author of this chapter is not eloquent, he at least has that earnestness which approaches eloquence. What he says is born of conviction. How he says it at once commands attention and wins admiration. After a careful study of the anatomy and physiology of the endometrium, the ætiology, pathology, symptoms, and treatment of endometritis are discussed at some length. It is in the use of the curette and his advocacy of curettage of the uterus for endometritis and acute pelvic inflammations that the author advances his most convincing arguments. In such inflammations he shows that perito-

nititis is traced through salpingitis back to endometritis; that peritonitis is not a disease *per se*, but merely "an effort on the part of nature to check a disease." The treatment of such cases by poultices or hot douches he denounces as "the method of the midwife." Primary *coeliotomy* he stamps as rash and irrational. Curettement and treatment of the uterus as any septic cavity is the only method which can be accepted as rational,—a method no longer new and experimental, but the one accepted by many American gynaecologists. A passing glance is given the electrical treatment of endometritis. The author regards it as unscientific, and its existence due to the "timidity of suffering womankind, who dread operation." This chapter is the strongest in the book.

It is worth the perusal of every physician. A wider dissemination of the principles which it teaches will lead to a more rational standard of treatment, and safer and more certain results.

In the chapter on lacerations of the soft parts there is nothing new. The methods already in vogue and well known are rehearsed. We notice that in the description of each operation the technique is given in accurate detail, so that even the novice would find in these descriptions a perfect guide.

Distortions and malpositions next receive attention. The author pays his respects to antelexions by showing that the symptoms accompanying this condition are due to pathological changes in the endometrium. Dysmenorrhœa is due not to obstruction of flow, but to degenerative changes which the flexion produces. The question of sterility of uterine origin he dismisses in a few words. The obstruction theory of Sims and his followers he regards as illogical and incompetent to meet the objections raised by more recent physiological and pathological investigations. "Flexure," says the author, "undoubtedly produces degenerative changes, but it is those changes and not the flexure which prevent conception." With such premises there is but one logical treatment,—*viz.*, curettage. The use of stem pessaries for these conditions is regarded as unscientific and unsatisfactory. "They produce discharges which they are sup-

posed to drain away. They frequently convert a simple into a purulent endometritis." The operation of hysteropexy for the correction of retropositions is given but passing notice. So valuable a procedure should receive more than a superficial comment. A more lengthy discussion of its merits or defects would add much to the value of this contribution.

Altogether this chapter is a most valuable one, and for the most part in harmony with the best scientific thought.

Uterine neoplasms receive a large share of attention. The pathology of uterine fibroids receives a most thorough and satisfactory discussion. Among the non-operative measures for relief, ergot is recommended; careful observers testifying that it not only relieves symptoms, but in all cases reduces the tumor, a number of cases being reported of the voiding of tumors under its use. Electricity is considered purely experimental; while the treatment of fibroids by the galvano-puncture is condemned in an uncompromising manner.

Among the operative procedures are considered vaginal enucleation, myomectomy, oöphorectomy, and total abdominal hysterectomy. These operations are described in detail, and the special variety of cases to which they are applicable is fully discussed. The remainder of the chapter is devoted to a general consideration of the whole subject.

This is a valuable summarization. It is a succinct analysis of the different classes of cases, and the mode of procedure best adapted to each. Several pages are devoted to the sequelæ subsequent to coeliotomy for fibromyomata. A general outline of the treatment for these complications completes an exceedingly valuable and interesting chapter.

As inflammations of the female pelvis and pelvic organs constitute a very large proportion of the diseases of women, it is to be expected that the chapter on pelvic inflammation should receive extended consideration. All those conditions described by the terms salpingitis, pyosalpinx, ovarian abscess, perimetritis, parametritis, peri-uterine phlegmon, pelvic abscess, pelvic cellu-

litis, and pelvic peritonitis are treated as different manifestations of a single disease, or as the same disease attacking in its progress the different anatomical portions of the female pelvis. The causation of these varied manifestations is septic or specific infection. It is from this premise that the author deduces his subsequent conclusions. The pathology of this disease is considered at some length. The treatment offers many valuable suggestions, and will be read with interest.

The succeeding chapters treat of ectopic gestation, diseases of the ovaries and tubes, and diseases of the bladder, and the book is concluded by a chapter on after-treatment in gynæcological operations. This chapter proves a novel and interesting feature. It is full of suggestions, and will be found a valuable aid to those who desire information on this subject. It deals with a subject which has heretofore received too little consideration. It puts into permanent form a mass of knowledge which for a long time has remained traditional for the want of some one to interpret. We unhesitatingly recommend this book to those who wish to be in touch with the most recent gynæcological thought. There will be found little that is extraneous, and much that is valuable. The style in general is clear and concise, the matter is fully up to date. As a thoroughly practical book it cannot be too highly commended.

WILLIAM FRANCIS CAMPBELL.

SYPHILIS IN THE INNOCENT (SYPHILIS INSONTIUM), Clinically and Historically Considered, with a Plan for the Legal Control of the Disease. By L. DUNCAN BULKLEY, A.M., M.D. Pp. 416; cloth, 8vo. Bailey & Fairchild, 29 Park Row, New York, 1894.

This is the essay to which, in 1891, the College of Physicians of Philadelphia awarded the Alvaregna prize for the best memoir on any medical subject. The book well merits the honor thus conferred, for the arrangement is excellent, the classification is detailed, logical and consistently followed, the subject matter is valuable and clearly presented, and the conclusions are of great practical importance.

"Syphilis is not essentially a venereal disease. It has been too frequently regarded as being only such, and consequently some of its important features have been overlooked. Many able writers describe well its clinical history, pathology, and treatment, as also its connection with prostitution; but the element of its non-venereal character, in many instances, has been relatively little considered, and no full presentation of the subject has ever been made. In the present essay the attempt is made to consider only this single aspect of the malady,—namely, its innocent occurrence, and the modes of infection whereby it is innocently acquired, by means wholly unconnected with the venereal act."

Owing to the vast extent of the subject even this field of investigation has been subdivided; hereditary syphilis and syphilis acquired in the ordinary relations of married life have been omitted.

The amount of material which the author has collected for his work is enormous. As a result of his own years of experience he gives clinical reports of 116 cases of extragenital chancres, a greater number than has ever been reported by any observer in the United States. One table of 7000 cases of chancres, with their location, is given; another table of 9000 extragenital chancres has also been collected. Still another table, as complete as possible, gives the epidemics of syphilis which have occurred from the year 1577 to the present time; this contains data relating to over 100 epidemics, great and small, affecting over 3000 victims, in addition to the many instances where no definite statistics were given. In all cases the original reports have been consulted wherever this was possible; this alone necessitated the study of the medical literature of the entire civilized world. The analytical bibliography in which the results of this study are given fills 150 pages, and refers to cases reported by 1500 writers; a synopsis is also given in which all these are analyzed. A more complete or more systematic treatment of a subject would be difficult to imagine.

The classification which is adopted developed from the study of the records themselves. This practical basis shows that syphilis

insontium is transmitted by many modes of infection, but that all of these may be grouped under three main heads: (1) In connection with household and industrial life; (2) in the care of children; (3) in professional pursuits. The two groups first mentioned are, of course, important, but from the stand-point of the physician himself the third group of cases attracts especial attention.

In the third group, three subclasses are easily differentiated: (1) Where the operator is the victim; (2) where the operator is the syphilifer; and (3) where the operator is the medium of syphilitic infection. The numerous cases reported, showing the many ways in which physicians are infected in the course of professional duty, are both sad and instructive. Not less so are those instances—not a few in number—where the physician or midwife has been the means of infecting persons under their care with the repulsive disease. “The subject of the conveyance of syphilis by vaccination is a very large one, and could alone fill many books with the data which have been recorded in connection therewith.” Circumcision, confinement cases, and various operations, where surgically unclean instruments have been used, have all added their scores of victims to swell the list of unfortunates. These cases must not be attributed to ignorance alone. When it is remembered that it is a common practice in many dispensaries to class venereal diseases with surgical cases, and to treat both classes of patients in the same room, and often with the same instruments and hands with no attempt at immediate sterilization, the wonder is that cases of syphilitic infection, as a result of such inexcusable carelessness, are not more frequent. One noted ear specialist alone is held responsible for sixty cases of syphilitic inoculation due to the use of a dirty Eustachian catheter. In many cases, however, no amount of human wisdom could possibly have foreseen, nor could any reasonable amount of care have prevented, the sad events recounted.

The book closes with an excellent chapter upon prophylaxis, hygiene, and medico-legal considerations. Dr. Bulkley makes a strong plea that the disease shall be placed in the same category as other contagious diseases, and be kept under rigid legal control. “The

disease is undoubtedly upon the increase, owing to the utter lack of sanitary control over the greater part of the world. More deaths are ultimately caused by syphilis than by small-pox, while the injury to health and interference with life-work are much greater in the former than in the latter. The time has come to place it under the control of proper health officers, and to make it *quite as criminal to transmit syphilis wittingly* as it is to communicate small-pox, scarlatina, or diphtheria. Society has the same right as in other contagious disease to protect itself by scientific treatment and by legal penalties." These are Dr. Bulkley's views, and the entire chapter is heartily to be commended.

H. P. DE FOREST.

TO CONTRIBUTORS AND SUBSCRIBERS.

All Contributions for Publication, Books for Review and Exchanges should be sent to the Editoria Office, 386 Grand Avenue, Brooklyn, N. Y.

Remittances for Subscriptions and Advertising and all business communications should be addressed to the

UNIVERSITY OF PENNSYLVANIA PRESS,
716 Filbert Street,
Philadelphia, Pa.

SURGERY OF THE URETER.¹

By CHRISTIAN FENGER, M.D.,

OF CHICAGO,

PROFESSOR OF CLINICAL SURGERY IN THE NORTHWESTERN UNIVERSITY
MEDICAL SCHOOL AND IN THE CHICAGO POLYCLINIC; SURGEON TO
THE EMERGENCY, THE GERMAN, THE MERCY, AND THE
NORWEGIAN HOSPITALS.

ANATOMY.

THE ureter is a cylindrical muscular canal, in the living subject probably contracted to some extent, with a rather uniform diameter of three to four millimetres throughout its entire extent, from the pelvis of the kidney to the bladder. It varies in length from eleven to thirteen and a half inches, according to Henle,²⁸ ten to twelve inches according to Tanquary,⁶⁹ cited by Van Hook,⁷⁷ and Tanquary states that it never exceeds fifteen inches.

Its course is straight or slightly curved as it passes down from the kidney, and its direction is somewhat oblique, towards the median line. The curve described is sigmoid; above the small pelvis, the slight convexity is towards the median line; while the pelvic portion is more strongly curved, almost the arc of a circle (Tanquary), with its convexity directed towards the lateral wall of the pelvis, until it finally reaches the neck of the bladder, the wall of which it penetrates so obliquely that it runs for half or three-quarters of an inch between the muscular and mucous coats (Cabot).⁹ In the male it crosses the vas deferens on the posterior wall of the bladder; in woman it crosses the cervix and enters the bladder at a point midway between the meatus urinarius and the cervix.

¹ A short *résumé* made by request of the President of the American Surgical Association to introduce the discussion on this subject at the Annual Meeting of the Association, May, 1894. For references and bibliography, see page 294.

The canal is not absolutely uniform in calibre throughout its entire course; Hallé²⁷ and Tanquary have pointed out that in normal subjects it is narrowed in three places,—namely: (*a*) at a point between one and a half and two and a half inches from the pelvis of the kidney; (*b*) at the junction of the pelvic and vesical portions; and (*c*) at the place where it crosses the iliac artery, found in three out of five subjects. These localities correspond with the places where small stones from the kidney have been found to be arrested.

In the same connection it is well to remember the variations in the upper end of the ureter as pointed out by Hyrtl.²⁹ In the first variety there is no pelvis, but the ureter divides into two branches without dilatation at the point of division, each branch having a calibre a little larger than that of the ureter. In the second variety there is a pelvis,—that is, a funnel-shaped dilatation at the point of division. The upper portion is the smaller and terminates in three short calyces; the lower and more voluminous portion terminates in four or five calyces. In the third variety there is only half a pelvis,—that is, the lower branch divides and is funnel-shaped, forming a narrow pelvis which terminates in one, two, or three short calyces; while the upper is not dilated and extends to the upper portion of the kidney as a continuation of the ureter. The ureter not uncommonly divides far below the kidney, between the kidney and the bladder; sometimes there is no division at all, and two separate ureters enter the bladder.

There is one variation in the point of entrance of the ureters into the bladder, which is of especial practical importance,—namely, those cases, few in number, in which the ureter, instead of entering the bladder high up or low down, posterior to the sphincter of the urethra, opens into the latter at or near its external orifice, or even into the vagina (Secheyron).⁶⁵ This anomaly causes a congenital partial incontinence of urine, for the relief of which successful operation has been performed.

In passing down from the large to the small pelvis, the left ureter lies between the vertebra and the psoas muscle, while on the right side, on account of the vena cava inferior, the ureter is situated a little more laterally.

The relation of the ureter to the peritoneum is an important consideration in the surgical anatomy of the ureter. This was first carefully studied by Cabot, who pointed out that in the extra-peritoneal operations, especially in fat subjects, it is extremely difficult to find and recognize the ureter in the deep wound, unless guided, for instance, by the presence of a stone. The ureter is adherent to the peritoneum, and always follows it when it is stripped up from the parts behind. This fact has occasionally been mentioned before, by Crampton,¹³ Twynam, and others, but the condition was not studied until Cabot made microscopical sections of the ureter and peritoneum, and demonstrated that the ureter is bound to the under surface of the peritoneum by fibrous bands.

Cabot further pointed out, that the relation of the ureter to that part of the peritoneum which is adherent to the spine is rather constant, the ureter being situated just external to the line of adhesion. Therefore, when the operator has stripped up the peritoneum and reached this point, he will find the ureter on the stripped-up peritoneum a little external to it. On the left side, the distance from the line of adhesion to the ureter is from half an inch to an inch; while on the right side the distance is somewhat greater owing to the outward displacement of the ureter by the interposition of the vena cava inferior between it and the spine.

As a guide in the palpation of the ureter on the living subject in examining for stone, dilatation or extravasation consequent upon rupture, the following landmarks are given by Tourneur,⁷⁰ cited from Tuffier:⁷³

The course of the abdominal portion of the ureter in the large pelvis corresponds to a vertical line erected upon a point at the junction of the internal and middle thirds of Poupart's ligament. Tourneur considers its direction vertical from the border of the kidney down to the small pelvis, over the brim of which it passes four and a half centimetres from the median line. The exact location of this point is the intersection of a horizontal line drawn between the anterior superior iliac spines and a vertical line passing through the pubic spine. At this point, under favor-

able circumstances, a dilated or tender ureter may be felt, by gentle, steady pressure backward upon the abdominal wall until the resistant brim of the pelvis is reached.

The vesical portion of the ureter can be palpated in man through the rectum. Guyon²³ has called attention to the exquisite sensitiveness of this portion of the ureter upon rectal exploration in cases of stone, even when located high up. In woman vaginal examination permits the palpation of the ureter to an extent of two or even three inches, as it runs in the broad ligament in close relation to the upper wall of the vagina (Cabot).

SURGICAL ANATOMY.

Access to the ureter, which is most often required for the removal of stones, is gained by two different routes, the transperitoneal and extraperitoneal.

By means of a median or lateral abdominal incision the entire course of the ureter can be reached with comparative ease, but intraperitoneal operations upon a ureter wherein the urine is not absolutely aseptic should not be undertaken if an extraperitoneal operation is possible, on account of the danger of peritonitis. This is well illustrated by the transperitoneal uretero-lithotomy performed by Cullingworth,¹⁴ whose patient died from peritonitis.

On the other hand, abdominal examination for diagnostic purposes, to locate a stone or a paraureteral urinary infiltration following rupture, has been of value when followed by extraperitoneal operation as evidenced in the cases of stone operated upon by Hall²⁶ and Arbuthnot Lane,¹¹ and in the cases of rupture reported by Page⁴⁶ and Allingham.²

Extraperitoneal access to the ureter is technically much more difficult, because of the depth of the wound, but as by it the danger of peritonitis is avoided, it is on the whole preferable. The upper two-thirds of the ureter—that is, the abdominal portion and the portion which extends over the brim of the pelvis—can be reached by a continuation of the ordinary oblique incision for lumbar nephrotomy from the twelfth rib down along and one inch anterior to the ilium, and along Poupart's ligament to about its middle.

Cabot thinks that it would be possible in a very thin subject with lax abdominal walls, or in children (Twynam), to gain access to the ureter down to within an inch or two of its entrance into the bladder by extraperitoneal incision, but on account of the depth of the wound in this place operation would be difficult.

The lower pelvic portion of the ureter can be reached by the sacral operation; an incision lateral to the sacrum, as proposed by Delbet,¹⁶ or better by Kraske's operation, or the osteoplastic resection of the sacrum, as proposed by Cabot, who made investigations on the cadaver and found ample space for careful inspection and operation.

In women the pelvic portion of the ureter can be reached through the vagina. Ureteral fistulas opening into the cervix and vagina have been operated upon, and stones in this portion of the ureter have been removed by Emmet¹⁹ when situated low down, close to the vesical orifice, and by Cabot when located higher up, in the broad ligament, close to the cervix uteri.

INJURIES TO THE URETER.

Accidental wounds, of which Tuffier found only five cases in the literature, three incised or punctured wounds and two gunshot wounds, have not as yet been treated by direct ureteral surgery, as these cases date back to a time when such a procedure had not been thought of. If positive diagnosis can be made (and intermittent discharge of small quantities of urine at the time might make the diagnosis positive), and if the external wound is extraperitoneal, there is no reason why the ureter should not be cut down upon, and the wound treated by one of the methods now at our disposal.

Subcutaneous wounds or ruptures of the ureter have been carefully studied by Herbert Page, who collected ten cases from the literature to which he added one of his own. Five additional cases have been reported by Le Dentu,¹⁷ making sixteen in all. In these cases the traumatism was caused either by a direct blow on the abdomen, such as the kick of a horse (Pye-Smith, Chaput), by a blow in the region of the kidney (Soller), by a blow from the handle of a wheelbarrow (Allingham), by being run over by

a wagon (Page, Barker, Godlee, Bardenheuer), by traumatism from over-stretching (my case), or by violent displacement of the kidney and pelvis whereby the ureter was ruptured in the upper portion (Le Dentu).

It is uncertain whether by these injuries the ureter is crushed against the transverse process of the first lumbar vertebra, as Tuffier thinks, or is so stretched from the kidney as to rupture in its upper portion, as in my case. Both methods are possible. The fact remains, however, that most of the ruptures are found above the small pelvis.

Early diagnosis is often difficult, if not impossible, because of the uncertainty of the symptoms. Slight transient hæmaturia, which might easily be overlooked, was noted in only three cases (Barker, Allingham, and Page). Copious hæmaturia, as reported in Hick's case, indicates rupture of the kidney rather than of the ureter. Hæmaturia may be entirely absent, as in Godlee's case.

If no injuries to other organs complicate the ureteral rupture, there are no grave symptoms in the beginning.

The next important symptom, swelling from the accumulation of urine around the place of rupture, is not seen until some time after the receipt of the injury: seven days (Allingham); two weeks (Chaput); two to three weeks (Godlee, Page, Barker, Hicks); thirty-nine days (Croft); seven weeks (Stanley), or several weeks (Cabot). The swelling is usually accompanied by pain, is localized, round, oblong or sausage-shaped, following the course of the canal, and is palpable from the abdomen.

The surgical treatment has never yet been directed in an early stage to the ureter itself, but has consisted in *puncture*, single (Joel), once repeated (Hicks), or five times repeated (Stanley), all of which were successful, or incision and drainage either through the abdominal cavity (Chaput, Page), or through the lumbar region (Allingham).

In most of the cases septic infection of the kidney took place through the resultant fistula, and secondary nephrectomy was necessary in order to save the patient's life (Godlee, Page, Barker, Chaput, and Bardenheuer). In other cases wherein the collection was not even opened and the patients survived, the kidney remain-

ing, obliteration of the ureter (Havilland), or strictures ensued (Pye-Smith, Soller, and my case).

As before mentioned, suture of the ruptured ureter has not yet been attempted, but, as Page points out, it might possibly be done, although it will probably be difficult to find the rupture, and this so much the more as an early diagnosis is rarely made. It is ordinarily not until some weeks later, when the swelling from urinary infiltration sets in, that operation is resorted to. Whether or not the ureter can be found in this cavity, which usually contains infected urine, and the rupture successfully dealt with, is as yet an open question.

OPERATIONS ON THE URETERS FOR STONE.

Stones in the ureter are most commonly arrested in the upper portion and with about equal frequency in the middle and vesical portions. They are removed by different methods according to their location.

(a) *Removal through the Bladder.*—Stones have been removed by dilatation of the female urethra by Emmet, Berg,⁶ Richmond, Czerny, and Sānger; by suprapubic cystotomy in two cases (Tuffier). Ureteral stones often protrude into the bladder, and can be recognized by the sound. The mucous membrane covering them may have to be divided, but the stones are usually extracted without difficulty. The wound in the vesical end of the ureter is usually left open, but is sometimes sutured, as in the case reported by Berg. Stones in this location, so far as operative procedure is concerned, should be classed among stones in the bladder.

When the stones are located a little higher up but not accessible from the bladder, they may be reached from the vagina or rectum by—

(b) *Ureterotomy through the Rectum.*—Ceci¹¹ removed successfully a stone from the ureter by incision through the rectum.

(c) *Ureterotomy through the Vagina.*—Removal of stone by means of vaginal ureterotomy has been performed by Emmet and Cabot.

EMMET'S CASE.¹⁹—Female. Click having been elicited by the sound, ureteral stone was suspected. On backward pressure with larger sound, stone could be felt through vagina and rectum. Stone cut down upon through vaginal wall by scissors. Opening enlarged forward towards the neck of the bladder. This being the only safe direction to avoid entering the peritoneal cavity. Opening closed with interrupted sutures. Good recovery.

CABOT'S CASE.¹⁰—Woman aged thirty-nine. Attacks of renal colic for sixteen years, often followed by passage of stones. Left pyonephrosis felt as distinct tumor. Vaginal examination revealed small, hard mass in left broad ligament close to cervix uteri. Sound in bladder could not be brought within half an inch of mass. Ureterotomy and removal of stone through the vagina. Evacuation of ten to twelve ounces of pus. Tumor in region of kidney disappeared. Uretero-vaginal fistula remained for four months with small amount of pus. The author concludes that the kidney was destroyed so far as secreting tissue is concerned.

(d) *Extraperitoneal ureterotomy* has been performed in five cases by Twynam, Cabot, Ralfe and Godlee, Kirkham, and myself.

TWYNAM'S CASE.⁷⁵—Boy, eight years. Left renal pain, hæmaturia. Laparotomy for diagnosis revealed stone in right ureter just below brim of pelvis. Laparotomy wound closed. Three weeks later extraperitoneal incision in right iliac region, ureterotomy, removal of stone, ureterorrhaphy, drainage; recovery. Long ends of sutures brought out of wound.

CABOT'S CASE.⁹—Man, forty years. Seven or eight sharp attacks of pain, referable to left side of abdomen above middle of Poupart's ligament, during three months before operation. Sensitive spot on back midway between crest of ilium and twelfth rib. Diagnosis: stone in ureter. Lumbar incision; ureterotomy; removal of calculus two inches below kidney; wound in ureter not sutured. Recovery.

RALFE AND GODLEE'S CASE.⁵⁶—Woman, twenty-six years. Nephritic colic persistent on left side. Lumbar nephrotomy. No stone in kidney. Exploration revealed stone in left ureter two inches below kidney. Longitudinal ureterotomy; removal of stone. Subsequent right renal colic; lumbar nephrotomy. No stone in kidney or ureter. Subsequent passage of gravel and small stone per urethram. Recovery.

KIRKHAM'S CASE.³⁷—Man, fifty-eight years. Right renal colic, followed by pain on left side and anuria. Diagnosis: destruction of right kidney by previous attack; left kidney now affected. Exploratory left lumbar incision. Palpation of kidney negative. Stone in ureter one-half inch above crossing of external iliac artery. Ureterotomy; removal of stone; no sutures; drainage. Recovery.

FENGER'S CASE.³⁸—Man, thirty-five years. Increasing attacks of renal colic for two years. No hæmaturia; no tumor. Diagnosis: nephrolithiasis. Lumbar nephrolithotomy. No stone in kidney. Palpation showed two stones in ureter one and a half inches below kidney. Longitudinal ureterotomy; no sutures. Recovery.

(e) *Intraperitoneal ureterotomy* has been performed in two cases by Cullingworth and Arbuthnot Lane.

CULLINGWORTH'S CASE.¹⁴—Woman, thirty years. Right renal colic; large pyonephrosis. Vaginal examination showed hard masses to right and left of uterus. Diagnosis: right pyonephrosis and independent ovarian disease. Laparotomy. Right ureter dilated. Stone immediately above bladder. Ureterotomy; removal of stone; escape of pus. Ureterorrhaphy, with interrupted silk sutures. Glass drain in abdomen. Death, peritonitis, in eighty hours. Autopsy revealed right and left pyonephrosis. Sutures in ureter held.

ARBUTHNOT LANE'S CASE.⁴¹—Woman, twenty-three years. Left renal colic for twenty years. Hæmaturia; pyuria; laparotomy. Pelvis of left kidney dilated. No stone. Ureteral opening could not be found. Eight months later laparotomy. Stone in pelvic portion of ureter forced up to crest of ilium. Abdominal ureterotomy; removal of stone. Ureterorrhaphy, with continuous silk suture. No leakage. Recovery.

Diagnosis as to the location of the stone was made before operation only in the cases in which the stone was afterwards removed through the rectum or vagina (Ceci, Emmet, Cabot). When the stones are located higher up, it is, as a rule, impossible to make a positive diagnosis. In the small pelvis, diagnosis may possibly be made by vaginal examination, but in Cullingworth's case he mistook them for diseased ovaries, and positive diagnosis was not made until the abdomen had been opened.

If the stone is located still higher up, diagnosis of location is wellnigh impossible. Cabot made the diagnosis of stone in the ureter, but could not locate it until after lumbar incision had been made.

The location of the stone in the ureter has not been determined until exploratory incision, either extra- or intraperitoneal, has been made. When the stone has been found in this way, its removal has been accomplished either by pushing it up into the pelvis and extracting it through an opening in the pelvis or kidney or by longitudinal ureterotomy.

It is often impossible to push the stone up into the pelvis, because of the local dilatation of the ureter, the nest, as Le Dentu calls it, but some operators, such as Israel, Von Bergmann, in two cases, Hall and Tuffier, have succeeded in accomplishing this. I once tried, unsuccessfully, to push a stone into the pelvis by a needle passed through the wall of the ureter. I do not consider this procedure important if the ureter can be reached by an extra-peritoneal incision.

The difficulty in dislodging the stone is well illustrated in the case reported by Hall, who succeeded only by manipulations with one hand in the abdomen.

HALL'S CASE.²⁶—Woman, thirty-six years; had had recurrent attacks of renal colic for four years. No hæmaturia. Pain in region of left kidney, which could be palpated between the hands. Examination caused no hæmaturia. No stone could be felt. Diagnosis: stone in kidney or ureter. Dr. Hall was unwilling to make lumbar incision on uncertain diagnosis, and advised exploratory laparotomy. Examination in narcosis revealed small tumor in region of left kidney, this was the dilated ureter above the stone. Abdominal section. Stone could now be felt about three inches below kidney. Diagnosis: impacted stone in ureter. Lumbar incision for removal of stone. Stone difficult to dislodge, finally accomplished by hand in abdomen. Incision on convex surface of kidney, invagination of sac consisting of dilated ureter and pelvis. Extraction of stone. Recovery.

The dislodgement and removal of the stone was easy in the case reported by Tuffier.

TUFFIER'S CASE.⁷⁵—Renal colic for nine years, finally with constant pain. Right kidney enlarged. Nephrolithotomy. Examination revealed no stone. Examination of ureter showed hard ovoid body, three centimetres long, at place where ureter crossed the promontory. Stone movable, and was pushed up into pelvis of kidney. Incision of convex surface of kidney. Extraction of stone. Suture of kidney and lumbar wound. No drainage. Healing by first intention.

Longitudinal ureterotomy has thus been done in five cases through an extraperitoneal incision, all of which were successful; and in two cases through the abdomen, one case was successful, and one patient died from peritonitis.

The treatment of the ureteral wound is different in the extra- and intraperitoneal operations. In the intraperitoneal operations, immediate, absolute closure of the ureter is of vital necessity; as the urine above a stone is almost always infectious, the question of accurate suturing is one of great importance. In the extraperitoneal operation, where the infected urine can be drained out effectually until the wound closes, the question of suturing is of little import.

In his transperitoneal operation, Arbuthnot Lane used a continuous silk suture with perfect success. In Cullingworth's intraperitoneal operation he employed interrupted silk sutures, and post-mortem examination revealed no leakage from the wound in the ureter.

In an extraperitoneal operation, Twynam applied interrupted silk sutures, the long ends of which were brought out through the wound. As might be expected, these sutures did not hold.

In some of the extraperitoneal operations no sutures were used, but drainage was employed, and the wound closed in Kirkham's case in forty days; in my case of stone, in a month; in my case of exploratory longitudinal ureterotomy, in fifty days, and in Cabot's case the wound also closed without disturbance.

Whenever practicable the stone should be removed through a lumbar incision rather than through the abdomen. Stones located low down in the small pelvis, which cannot be pushed up within the reach of an extraperitoneal incision, like that for liga-

tion of the iliac artery, might be reached by a sacral operation, although no case of this kind is as yet on record.

Laparotomy for the purpose of diagnosing the location of the stone has been of value in several instances. In Arbuthnot Lane's case the stone was thus located after exploratory lumbar incision had failed. In this case, however, it might have been possible by opening the kidney or ureter, and exploring from above, to locate the stone through the lumbar incision.

In Hall's case the stone was located through a median abdominal incision and removed through a lumbar incision into the kidney. As in this case it had already been determined which ureter was the seat of the stone, the laparotomy might have been omitted.

In Twynam's case, however, the exploratory laparotomy was absolutely necessary, since the symptoms pointed to stone in the left ureter, which was healthy, while the stone was found in the right ureter, and was removed three weeks later by an extra-peritoneal ureterotomy.

OPERATIONS FOR THE RELIEF OF VALVE-FORMATION.

As valve-formation always causes an intermittent or a permanent impediment to the flow of urine, the pelvis of the kidney is in a state of hydro- or pyonephrosis. The so-called sac is accessible through the peritoneal cavity or by an extraperitoneal operation through the lumbar region.

The first attempt after Simon⁶⁷ to operate on the valve was made in 1890 by Trendelenburg,⁷¹ who opened the anterior wall of a large hydronephrotic sac by lateral laparotomy, saw the ureteral opening on the side of the sac, divided the ureter down to the lower part of the sac, to the inner wall of which he sutured the divided borders of the ureter. The ureteral opening was thus displaced from the side to the bottom of the sac, in order to keep the ureter patent. The result of this operation is uncertain, as the patient died from ileus.

In 1891, Küster,³⁹ in his celebrated case of resection of the ureter and implantation of the distal end into the pelvis, opened the hydronephrotic sac from the lumbar region, found the ureteral

opening, and divided it through its course in the sac-wall, with the intention of stitching the divided border to the inner wall of the sac, as Trendelenburg had done (see Figs. 1 and 2). Before finishing this operation, however, he explored the ureter and found a stricture, which caused him to abandon the operation for valve-formation, and to resect the stricture.

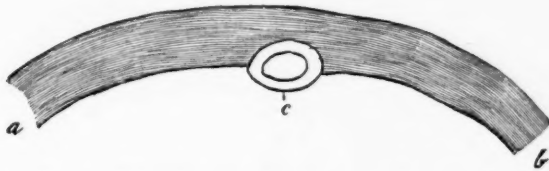


FIG. 1.—Küster's intended operation on the valve. (Same as Trendelenburg's.) *a, b*, wall of sac. *c*, transverse section of ureter.

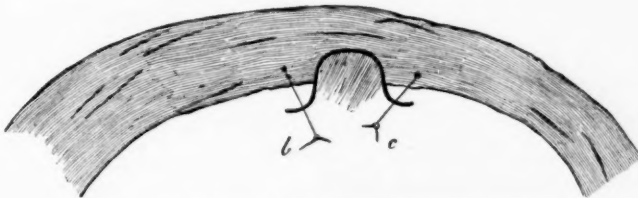


FIG. 2.—*b, c*, the ureter divided on its anterior surface. Near *b* and *c* are sutures uniting the borders of the divided ureter and the wall of the sac.

The third and first successful attempt at operating for valve-formation was made by me on May 31, 1892.

FINGER'S CASE.⁴¹—Woman, twenty-eight years. Valvular stricture or stenosis of pelvic orifice of ureter in a somewhat floating kidney. Intermittent hydronephrosis for eight years, with more and more frequently recurring attacks until one a week; nephrotomy between attacks. No stone could be found in pelvis. Pelvic orifice of ureter could not be found through opening in kidney. Incision of pelvis, whereupon valvular opening of ureter could be seen. Plastic operation on valve; bougie left in ureter for two days; pelvic wound sutured; fixation of floating kidney; recovery without fistula (Fig. 3).

The second successful operation was performed on August 14, 1893, by Herman Mynter,⁴² of Buffalo.

MYNTER'S CASE.—Man, twenty-five years. Valvular stricture of pelvic orifice of ureter. Intermittent hydronephrosis for twelve years. Periodical attacks of pain every two or three months in right

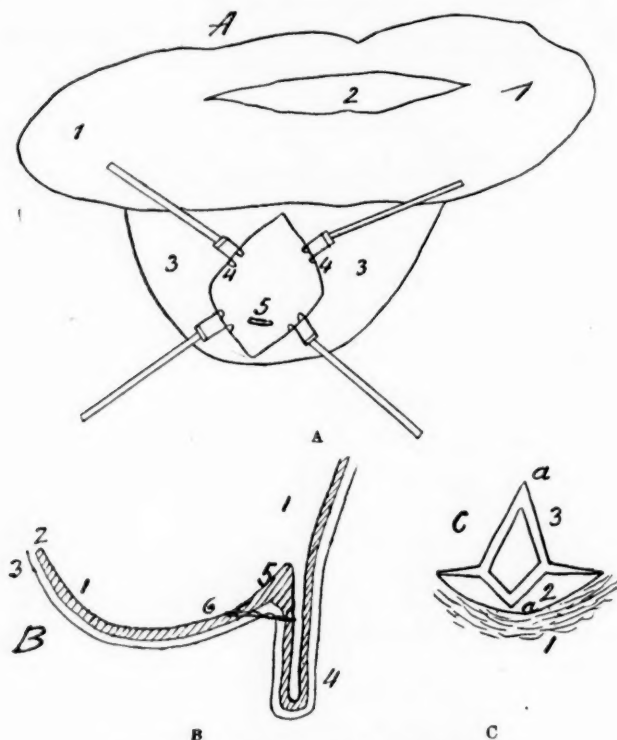


FIG. 3.—Illustrating operation for valve-formation.

A.—Kidney and dilated pelvis. 1, kidney; 2, opening on its convex surface after nephrotomy; 3, dilated pelvis; 4, with opening on its posterior surface from pelviotomy; 5, opening of the ureter into the pelvis, a small transverse crescent-shaped slit.

B.—Dilated pelvis and ureter, showing valve-formation. 1, pelvis; 2, mucous membrane; 3, muscular and external coat; 4, ureter; 5, valve; 6, line of incision dividing valve.

C.—Valve seen from the pelvis and divided to illustrate the plastic operation. 1, inner wall of pelvis above the ureteral opening; 2, ureteral opening; 3, the divided valve; *a* and *a*, the corners of incision to be united by a suture.

lumbar region. Diagnosis: right renal calculus producing occlusion of ureter. Exploratory nephrotomy. No stone found. Ureter per-

meable with valve-formation at pelvic orifice. Plastic operation on valve. Gauze drain. Recovery without fistula.

The operation for valve-formation can best be done by the extraperitoneal lumbar incision. The dilated pelvis or hydro-nephrotic sac is easily found and opened by a longitudinal incision. The opening of the ureter into the sac should be looked for, but cannot always be found, as in some cases it is very narrow. In such cases it may be located by incising the ureter below the sac and passing a probe upward towards the pelvis. The valve or inner wall of the ureter, running in the sac, is now divided longitudinally from the opening in the sac, and the resultant wound treated in one of the three following ways:

(a) By turning the flaps out and uniting them to the inner wall of the sac by sutures (Trendelenburg, Küster).

(b) By drawing the corners of the longitudinal incision together with one suture, transforming the longitudinal into a transverse wound, as in my operation.

(c) Uniting the wound longitudinally with numerous fine silk sutures, "taking in the outer two coats of the ureter and sac and avoiding the mucous membrane" (Mynter).

COMPRESSION OF THE URETER FOR DIAGNOSIS OF KIDNEY AFFECTIONS.

This has been done in order to collect urine from each ureter separately. It has been attempted from the rectum by Weir⁷⁹ and Sands.⁶² Tuchmann⁷² has compressed the ureter from the bladder by an instrument resembling a lithotrite between the jaws of which the ureter was caught. Silvermann⁶⁶ attempted to compress the ureter from the bladder by a balloon which, after introduction, was filled with mercury and was expected in this manner to make compression. All these attempts were, however, abandoned and gave way to catheterization.

CATHETERIZATION OF THE URETERS.

Catheterization of the ureter has reached a state of practical usefulness, as indicated by Simon,⁶⁷ only in women, on account of the ease of access to the vesical opening of the ureter in the

female. Pawlik⁴⁸ was the first to put this procedure in extensive practice. He has employed it since 1881. Pawlik was followed by Newman,⁴⁴ and the method has now been made reasonably practical chiefly through the arduous work of Howard Kelly,³⁴ who introduces Pawlik's catheter through Simon's speculum guided by a head-mirror.

Strictures of the ureter and accumulations of urine above strictures have been successfully treated in this way by Pawlik and Kelly.

Kelly³⁵ made a diagnosis of stricture low down in the left ureter by catheterization. The patient was catheterized about six times at intervals of ten to twelve days, each catheterization being followed by marked exacerbation of the pain for a few days. The consequence, however, of the repeated catheterization was marked relief for several months. The symptoms finally returned, the ureter was opened from the vagina and a small calculus removed from the ureteral orifice.

Pawlik⁴⁸ mentions a case of pyonephrosis from Billroth's clinic, in which he introduced into the ureter from the bladder a long elastic catheter with a metal point which passed through a stenosis of the ureter up into a cavity above. The patient had an abdominal fistula, the result of a previous nephrotomy, and a probe passed through this fistula would touch the metal tip of the ureteral catheter. On attempting to withdraw the catheter the tip was caught in the stenosis and broken off, and Dr. von Hacker removed it through the abdominal fistula.

Pawlik,⁴⁹ cited by Albarran and Lluria,¹ reports two cases of pyonephrosis in which this method was employed. In one case cure was effected after thirty successive soundings of the ureter; in the other, the ureter was impermeable and nephrotomy had to be made.

The treatment of tuberculosis of the bladder has been assisted by *permanent catheterization of the ureters* by Guyon,²⁴ cited by Albarran and Lluria,¹ who burned the tuberculous ulcers with the Paquelin cautery, packed with iodoform gauze, and was able to leave the ureteral catheters in for nine days.

As regards leaving the catheter permanently in the ureter,

Pawlik mentions a case of uretero-vaginal fistula in which a catheter was left in for seven days. Force was required to remove it, and it was found to be incrustrated with salts.

Weil,⁷⁸ in a case of uretero-vaginal fistula caused by a pessary, was enabled to stop the flow of urine by leaving a tube in the ureter for six days, when pain in the region of the kidney necessitated its removal.

A catheter left in the ureter for some time is apt to cause inflammation of the ureter, just as we find permanent urethral catheterization followed by inflammation of the urethra.

Poirier⁵⁸ cautions against leaving a catheter in the ureter. He mentions a case of Segond's of exstrophy of the bladder wherein catheterization caused pyelonephritis, and a case of his own, in the service of Tillaux, in which thirty-six hours after catheterization of the ureter, obstruction occurred, which caused an attack of renal colic. He also cited the experience of Sinitzin, who was never able to allow a sound to remain for more than four hours, and concludes that the harmlessness of the procedure is not altogether beyond question.

Catheterization of the ureters in man is difficult and uncertain of accomplishment. Perez⁵¹ concludes that it is of no importance, as it can be done only by epicystotomy. Poirier,⁵² however, has succeeded in introducing a catheter with the aid of the Nitze-Leiter cystoscope, but other attempts in this direction have not as yet brought practical results. It cannot be denied that catheterization through epicystotomy possesses some practical value. In one instance catheterization of the ureter to the healthy kidney in a case of left pyonephrosis in which granular casts were found in the urine, deterred Iversen³⁰ from performing nephrectomy.

Keen,³³ in a case of hæmaturia and suspected tumor of the bladder, made an epicystotomy, but found no tumor. As he was unable to determine from which of the ureteral openings bloody urine was evacuated, he introduced a catheter through each ureter, and collected the urine separately, as a result of which he ascertained that the hæmorrhage was from the left kidney.

It is to be hoped that by means of the cystoscope, or in

some other way, catheterization of the ureter in man may be made more practical.

OPERATIONS FOR STRICTURE OF THE URETER.

It is probable that only strictures situated in the upper abdominal portion of the ureter are accessible for operative interference. Such strictures have been dealt with in three ways :

(a) Dilatation by bougie as reported by Alsberg.

ALSBERG'S CASE.³—Lumbar nephrotomy in a case of left hydronephrosis. For ten days all urine passed through fistula, from which it was concluded that other kidney was defective in function. Ureter successfully dilated from wound by thin bougies. After several days urine passed through bladder. Some months later fistula closed. Hydronephrosis did not reappear.

(b) Longitudinal incision as practised by me. When the stricture is not too extensive, it is divided longitudinally after opening the ureter above or below. The upper and lower ends of the longitudinal wound are then brought together by folding the ureter upon itself. The remainder of the wound is united by sutures through the outer and middle coats, thus transforming the longitudinal into a transverse wound (Figs. 4 and 5).

FENGER'S CASE.²¹—Traumatic stricture of ureter close to entrance into pelvis of kidney; intermittent pyonephrosis for twenty-four years; increased frequency of attacks; nephrotomy; no stone in sacculated kidney; ureteral entrance could not be found; longitudinal ureterotomy revealed stricture at upper end of ureter; longitudinal division of stricture and plastic operation on ureter; recovery without fistula.

(c) Resection of the ureter and implantation of the distal end into the pelvis, as practised by Küster in the following case (Figs. 6 and 7):

KÜSTER'S CASE.³⁹—Boy, eleven years. Two years previous left hydronephrosis. Braun made lumbar nephrotomy, which was followed by vesical anuria and lumbar fistula. Two years later, dilatation of

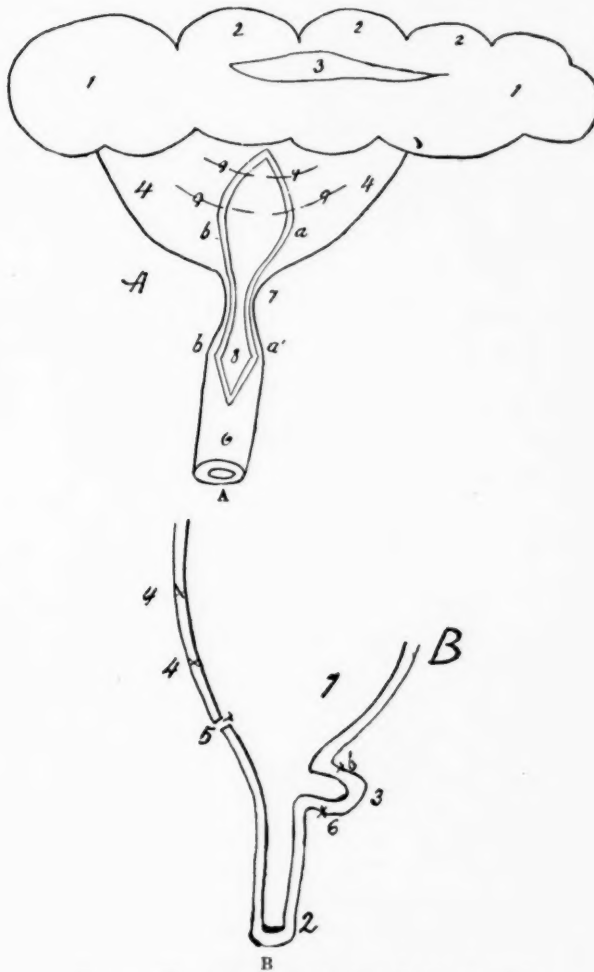


FIG. 4.—Illustrating operation for stricture of ureter.

A.—Sacculated kidney, dilated pelvis, ureter with stricture at its upper end. 1, kidney; 2, sacs corresponding to dilated calyces; 3, nephrotomy; 4, dilated pelvis; 5, opening in posterior surface of pelvis—pelviotomy wound; 6, ureter below stricture; 7, stricture in upper end of ureter; 8, opening in ureter below stricture, extending up through the stricture into the pelvis; 9, sutures closing the upper half of the wound in the pelvis; *a, a'* and *b, b'* points of incision in ureter and pelvis to be united by sutures after folding the ureter upon itself at the place of stricture.

B.—Pelvis and ureter after union by sutures. 1, pelvis; 2, ureter; 3, fold of ureter at place of stricture; 4, sutures of wound in pelvis; 5, place of sutures between points *a, a'* and *b, b'*; 6, 6, additional sutures, as many as needed, to close borders of the fold formed by approximations of *a* to *a'* and *b* to *b'*.

fistula and digital exploration of dilated pelvis. Catheterization of ureter from pelvis impossible. Septic pyelitis followed operation. Two months later patency of ureter secured in the following manner: Lumbar extraperitoneal incision; ureter could not be found; incision of dilated pelvis revealed the ureter; on attempting to introduce

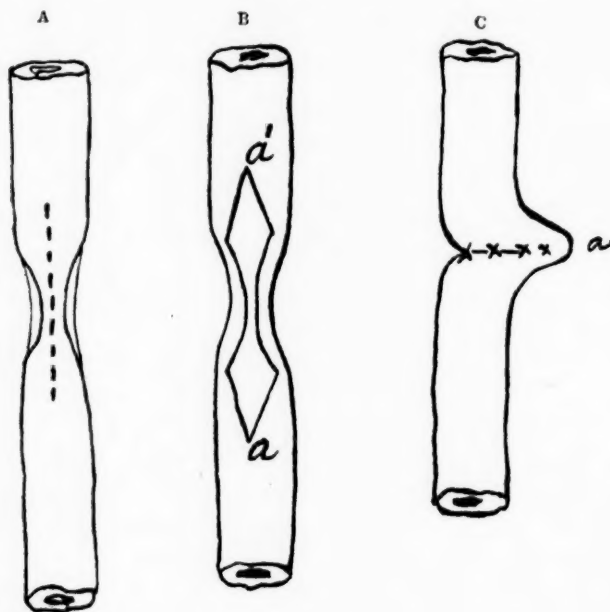


FIG. 5.—Fenger's plan of operating for ureteral stricture on extra-peritoneal surface of ureter.

A.—Ureter showing stricture and line of incision.

B.—Opening through the stricture extending into the proximal and distal portion of the ureter. The extreme ends of the incision *a* and *a'* to be united.

C.—Ureter after suturing; *a*, the bend at the site of the stricture.

probe into ureter stricture was encountered; transverse division of ureter below stricture and at pelvic entrance; union of ureter to pelvis by dividing upper end of ureter, unfolding divided end, and suturing it to opening in sac; remainder of wound closed by catgut sutures; urine passed through fistula for four months, when fistula was closed. Recovery.

WOUNDS OF THE URETER.

(a) *Longitudinal wounds of the ureter* have already been considered in the discussion of the operations for stone. An intraperitoneal longitudinal wound should be carefully united with extramucous sutures. In addition to the suture, Van Hook⁷⁷ makes a suggestion which appears valuable in cases where the incised ureter is covered with peritoneum,—namely, to slide a fold of peritoneum from both sides over the sutured wound and unite the peritoneum over it. If no peritoneum can be used, an omental graft may be employed.



FIG. 6.—Küster's operation for implantation of the ureter into the sac (pelvis). *a*, upper end of *a*, *b*, ureter running in the wall of the sac; *a, c*, slit in upper end of ureter.

(b) *Transverse wounds of the ureter* are much more difficult to treat satisfactorily, as there is a tendency to retraction and gaping of the wound, and as, if direct suturing is resorted to, even if the sutures do not tear out, there is always a tendency to stenosis.

Van Hook proposes in complete transverse wounds to transform the transverse into a rhomboid-shaped longitudinal wound by opening longitudinally upward and downward from the transverse wound and cutting off the four corners, thus creating a condition similar to that produced when a stricture of the ureter is opened longitudinally. The rhomboid wound may then be

united transversely by folding the ureter upon itself in the manner proposed by me in the operation for stricture.

This operation will probably be safe in extraperitoneal wounds; if, however, the wound opens into the peritoneal cavity, it is not certain that covering with a fold of peritoneum would be sufficient; it might be safer to divide the ureter completely and then resort to Van Hook's method of lateral implantation. The first method has not yet been tried for intraperitoneal wounds, the latter has been employed with good results.

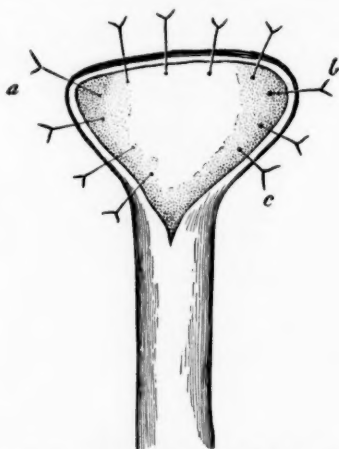


FIG. 7.—The divided end of the ureter unfolded, and in the extent of *a, b, c* sutured to the wall of the sac.

Attempts to unite complete transverse wounds of the ureter have, as a rule, failed in experiments upon animals and in operations on the human subject. In Tuffier's⁷⁴ experiments on dogs, death from peritonitis usually followed, and when union took place there was so much cicatricial constriction as to cause stenosis.

In the only case in which direct union has been attempted in the human subject, the result was also unsatisfactory. This case was reported by Schopf.⁶⁴

SCHOPF'S CASE.—During laparotomy for the extirpation of an intraligamentous ovarian cyst he divided the ureter near the brim of the pelvis. Having secured the divided ends by artery forceps he

united the ureter by eight silk sutures, which did not pass through the mucosa, and which probably invaginated the borders of the transverse wound. The patient made an uneventful recovery, but died seven weeks later from tuberculosis. The autopsy showed that the right ureter, at the place where it crosses the psoas muscle, was embedded in cicatricial tissue, and that a cicatrix existed in the entire circumference of union.

URETERO-URETEROSTOMY (VAN HOOK'S METHOD).

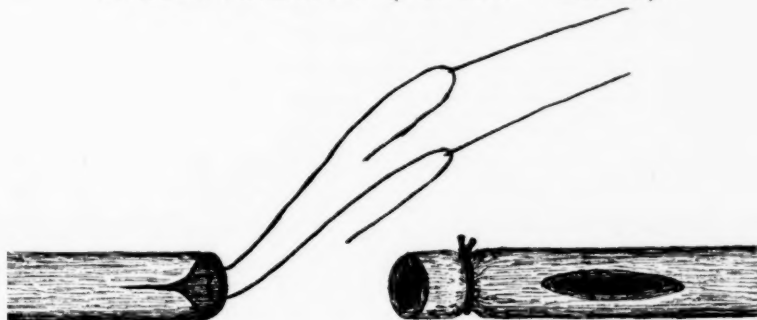


FIG. 8.—The needles have been introduced into the wall of the renal portion of the ureter. The end of the vesical portion of the tube has been ligated, and a slit made in its wall.



FIG. 9.—The needles carrying the traction suture attached to the renal portion of the ureter have been passed into the slit in the wall of the vesical portion, carried down a short distance, and pushed out through the wall.

The operator was dissatisfied with this result, and proposes in the next case to unite the transverse wound over a ureteral catheter brought out through the ureter and left in place during the healing of the wound to prevent leakage, and also stenosis.

Van Hook's method of invagination, or uretero-ureterostomy, as Kelly calls it, is an important step forward in this direction, as it has proved on animals and on men sufficient to prevent leakage and also stenosis. (Figs. 8, 9, and 10.) His method is as follows :

(1) Ligate the lower portion of the tube one-eighth or one-fourth of an inch from the free end. Silk or catgut may be used. Make with fine sharp-pointed scissors a longitudinal incision, twice as long as the diameter of the ureter, in the wall of the lower end, one-fourth of an inch below the ligature.

(2) Make an incision, with the scissors, in the upper portion of the ureter, beginning at the open end of the duct and carrying it up one-fourth of an inch. This incision insures the patency of the tube.

(3) Pass two very small cambric sewing needles armed with one thread of sterilized catgut through the wall of the upper end of the ureter, one-eighth of an inch from the extremity, from within



FIG. 10.—By means of the traction suture the renal portion of the ureter has been implanted into the vesical portion. The ends of the traction suture have been tied together.

outward, the needles being from one-sixteenth to one-eighth of an inch apart, and equidistant from the end of the duct. It will be seen that the loop of catgut between the needles firmly grasps the upper end of the ureter.

(4) These needles are now carried through the slit in the side of the lower end of the ureter into and down the tube for one-half an inch, where they are pushed through the wall of the duct, side by side.

(5) It will now be seen that the traction upon this catgut loop passing through the wall of the ureter will draw the upper fragment of the duct into the lower portion. This being done, the ends of the loop are tied together securely, and, as the catgut will be absorbed in a few days, calculi do not form to obstruct the passage of the urine.

(6) The ureter is now enveloped carefully with peritoneum, as

already described in other operations, provided an intraperitoneal operation has been done.

Bloodgood⁷ has repeated Van Hook's experiments with equally satisfactory results. In addition to Van Hook's procedure, Bloodgood applied two sutures through the external coats only as an additional security against leakage. His drawing of the united ureter (Fig. 12) shows not only no narrowing of the calibre at the point of union, but even a little diverticulum of the canal.

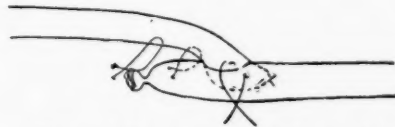


FIG. 11.—Ureter anastomosed; traction sutures tied, and two fixation sutures in place ready to be tied.



FIG. 12.—Longitudinal section of ureter showing new lumen and diverticulum.

A most important and interesting proof of the value of this method has been furnished by Kelly³⁶ in the first operation of this kind on the human subject. This important case was the following:

KELLY'S CASE.—Woman, twenty-five years. During hysteromyomectomy right ureter accidentally ligatured and transversely divided. Uretero-ureteral anastomosis by ligating lower end close to cut surface, and making a longitudinal slit, 1 centimetre long in its anterior wall $\frac{1}{2}$ centimetre below ligature. Invagination of upper into lower portion of ureter. Edges of slit sutured to intussuscepted ureter. Iodoform gauze drainage. Patient passed urine voluntarily on second day. Union by first intention. Recovery.

Division of ureter with loss of substance so considerable as to make reunion of the two ends impossible requires different operative procedures.

(a) *Implantation of Ureter into the Bladder.*—When the upper end of the divided ureter is long enough to reach the bladder, implantation into this organ is preferable to all other procedures, as the danger of subsequent infection of the ureter and kidney is thereby avoided.

The experiments of Paoli and Busachi,⁴⁷ in 1888, upon dogs were successful. Their method consisted in splitting the distal end of the ureter and uniting it by sutures to an incision in the bladder.

Extraperitoneal implantation of the ureter into the bladder has been made in one case by Baumm.⁵ The patient had a double ureter on the right side, one ending at the mouth of the urethra, and causing partial incontinence of urine. Baumm made a suprapubic operation, cut an opening through the bottom of the bladder and connected it with the proximal end of the accessory ureter, the distal end of which was ligated. The author himself does not recommend this operation, which he chose because the patient was a virgin, as he considers it under ordinary circumstances unnecessarily severe. He considers the operation through the vagina preferable.

Intraperitoneal Implantation of Ureter into Bladder.—In February, 1893, Novaro⁴⁸ operated successfully by the Paoli-Busachi method in the following case:

NOVARO'S CASE.—The patient had had vaginal hysterectomy performed for carcinoma, extending into the broad ligament; the operation was followed by uretero-vaginal fistula. Two months later laparotomy in Trendelenburg's position was made, the ureter dissected out from the vagina, divided for 1 centimetre, unfolded, and united by sutures to an incision in the bladder $1\frac{1}{2}$ centimetres long, situated two finger-breadths above the normal point of insertion. Gauze drainage out through the abdominal wound. For several days the gauze was impregnated with urine, showing leakage at the point of

union. This was only temporary, however, and ten days after the operation the function of the urinary organs was and remained normal.

In the two following cases of implantation into the bladder, the operators acted upon Van Hook's suggestion of uretero-ureterostomy, and the effect of the operation in each case was complete, as undoubtedly no leakage of urine took place.

KRUG'S CASE.³⁸—The case¹ was operated on in Philadelphia. The patient was a colored woman, about thirty years of age, who had suffered from a fibroid for over six years. During most of this time she had been subjected to electrical treatment. When I saw her on the morning of the operation, I found her very much emaciated, with a poor pulse. The tumor filled the entire pelvis, and extended above the umbilicus. On opening the abdomen, universal adhesions were found. After having removed the greater part of the omentum, I commenced by tying off the tube and ovary on the left side. The next ligature was placed around the round ligament, and the excess of the broad ligament on that side. Although I expected to meet with some difficulty in shelling out the tumor, which was entirely intraligamentous, and, therefore, paid particular attention to the ureter, I found that in cutting off the round ligament, I had cut the left ureter in front of the tumor. The tumor had evidently grown intraligamentous, unfolding the two sheets of the broad ligament, lifting up the ureter, and the injury was done at a place where I felt absolutely secure. Putting clamp forceps on the proximal and distal ends respectively, I finished the operation, which was an extremely difficult one. Finding, then, that I could reach the bladder without putting too much tension on the proximal end of the ureter, I decided to graft the ureter into the bladder. An incision being made into the bladder, the ureter was treated in a manner similar to that employed by Dr. Van Hook, in invaginating the cut ends of the ureter. In sewing up the incision in the bladder, care was taken to prevent leakage, without constricting the lumen of the ureter. Several tiers of running sutures were made, and all the available peritoneum used to build up a solid wall around the ureter. A permanent catheter was introduced into the bladder, which remained for four days. For

¹ Kindly communicated to me by Dr. Krug.

two more days the patient was catheterized every four hours. A normal amount of urine was passed right after the operation. There was no rise of temperature, nor any other untoward symptom. The patient left the hospital about four weeks after the operation; she is now doing hard work, and feeling splendidly.

PENROSE'S CASE.⁵⁰—Woman, forty years. Scirrhus carcinoma of cervix uteri, involving left broad ligament and about one inch of ureter involved therein. No obstruction of ureter. After removal of uterus, excision of one inch of ureter, distal end of ureter ligated, and proximal portion implanted into bladder after Van Hook's method. Abdomen closed without drainage. Good recovery.

The perfect success of the operation in these cases would seem to indicate that Paoli and Busachi may be right in proposing the application of this operation to uretero-uterine and uretero-vaginal fistulas. If this operation is as safe and certain as the above cases indicate, and if the future function of the implanted ureter remains undisturbed, this method would seem to be superior to the older plastic operations through the vagina, which are difficult in technique, uncertain in results, and which sometimes fail entirely.

OPERATIONS FOR URETERO-UTERINE AND URETERO-VAGINAL FISTULAS.

The prevention of the incontinence of urine caused by these infirmities is accomplished in three ways:

(a) Plastic operations with a view to displace the fistula from the vagina or cervix into the bladder.

(b) Kolpoplexis.

(c) Nephrectomy, the operation of last resort.

The plastic operations known by the names of their originators, Simon, Landau, Bandl, Schede, and Pozzi, who have brought them to their present state of perfection, I shall not detail here, but merely recall the main steps in the development of the operations.

Simon,⁶⁸ through a vesico-vaginal fistula, artificial if not pre-existent, opened the proximal end of the ureter from the bladder for some distance, cauterized the divided borders until cicatriza-

tion had taken place, thus securing against reclosure, and finally closed the vesico-vaginal fistula.

Landau⁴⁰ passed a catheter into the ureter through the vesico-vaginal fistula, bringing the distal end of the catheter out through the urethra, and by immediately closing the vesico-vaginal fistula invaginated the opening of the ureter into the bladder.

Bandl⁴ employed a combination of the methods of Simon and Landau.

Schede⁶³ inverted the ureteral opening into the bladder together with a zone of the surrounding mucous membrane, with the intention of preventing subsequent cicatricial stenosis.

Pozzi⁵⁵ employed with advantage a method by splitting similar to that devised by Gerdy for vesico-vaginal fistula.

These plastic operations are often difficult in technique. Repeated attempts at closure have frequently to be made, and in some cases inflammation of the ureters and kidneys has resulted. The operations on uretero-uterine and uretero-cervical fistulas are especially difficult. The operations are, however, rather taxing to the patience of the operator and patient than dangerous to life. They have always been attempted before the indirect methods of obliteration have been resorted to.

(b) Kolpokleisis, proposed by Vidal du Cassis and Simon, and first practised by Hahn,²⁵ consists in closure of the vagina on the distal side of a vesico-vaginal fistula, and possesses the disadvantage that the latter may contract, and that marital relations are made impossible excepting in the cases wherein partial kolpokleisis, as devised by Kaltenbach,³² can be made.

(c) Nephrectomy, the operation of last resort, really means the abandonment of the struggle with the fistula. It has been necessitated in some instances by infection of the kidney, and although not very fatal, as in fourteen cases on record only one patient died, it is applicable only to cases where the other kidney is healthy.

The operative results, as collected by Nebe,⁴³ in 1890, and Iversen,³¹ in 1892, were as follows: Of 14 uretero-uterine and uretero-cervical fistulas, all following childbirth, 8 were operated upon; 1 with hysterokleisis (Duclout); 1 kolpokleisis (Hahn), both relatively successful. The remaining six cases (Zweifel,

Credé, Fritsch, Netzel, Traub, and Iversen) were unsuccessful, and nephrectomy had to be made. It will thus be seen that direct displacement of the ureter into the bladder was not found applicable to this class of cases.

Of uretero-vaginal fistulas, 32 cases were collected by Nebe, 5 by Iversen, 1 by Arie Geyl, 1 by Pozzi, and 1 by Hergott (cited by Pozzi),—a total of 40 cases, of which 10 were secondary to operations or pelvic abscesses. Twenty-eight followed childbirth and in two the cause was unknown. Of these 40, 24 were operated upon as follows: Plastic invagination into the bladder through the vagina was successful in 10 cases (Bandl 2, Lanne-longue, Geyl, Parvin, Schede, Solowjeff, Schauta, Pozzi, and Hergott); kolpopleisis was performed in 5 cases (Gusserow 2, Kehrner, Schede, and Kaltenbach (partial)); and nephrectomy in 5 cases (Schede, Gusserow, Czerny, Heilbrunn, and Fritsch). In the remaining 4 cases attempts at operating were abandoned as unsuccessful.

In the 10 cases which did not follow childbirth, 5 followed vaginal hysterectomy, 3 pelvic abscess, and 2 operation on vesico-vaginal fistula. Two were cured by direct closure (Nicoladoni, Emmet); 3 by kolpopleisis (Kaltenbach 2, Hempel); in 3 nephrectomy was performed (Stark, Böckel, Bardenheuer, whose patient died). The remaining 2 cases both following pelvic abscess (Emmet) were not operated upon.

It will thus be seen that in 34 cases of ureteral fistula, this condition was remedied by plastic operations in 11 cases, by kolpopleisis in 7, hysterokleisis in 1, and nephrectomy in 15.

Taking into consideration the fact that in almost all, if not in all, of the cases the kidney in question was healthy from the beginning, it seems to be a reproach against our present methods of treatment that, in 44 per cent. of the cases, the kidney should have been sacrificed.

A pyelonephritis in its early stage is amenable to cure, as has been shown experimentally by Rovsing,⁶⁰ and Geyl²² may be right in calling attention to the possibility that a non-advanced stage of pyelonephritis may disappear when the distal end of the ureter is implanted into the bladder.

The successful implantations of the ureter into the bladder by Novaro, Krug, Penrose, and Baumm lead us to believe it possible in these cases to save the kidneys which would otherwise be sacrificed.

The congenital, abnormal opening of the end of the ureter outside of the bladder, in the urethra or the vagina causing partial incontinence of urine, is naturally treated in the same way as uretero-vaginal fistulas, either by vaginal, suprapubic, or abdominal implantation into the bladder.

The vaginal implantation, as probably the safest method, was chosen by Davenport¹⁵ in the following case:

DAVENPORT'S CASE.—Woman, twenty-nine years. Incontinence of urine from early childhood, due to malposition of the ureter. Incontinence increased by menstruation and pregnancy. One ureter was found in the vesico-vaginal septum running forward, its orifice being close to the external orifice of the urethra. Operation for displacement of ureter and implantation of its orifice into the bladder. Recovery.

Bois⁸ (d'Auvillac) reports the following case:

BOIS'S CASE.—Congenital incontinence of urine, although the bladder acted regularly. Fine canal in left wall of urethra from which urine continually dribbled. A probe at this point passed into the left ureter. Operation: division with tenotome of wall between ureter and bladder, and opening kept open by bougies. The closure of the peripheral end of ureter was postponed on account of pregnancy.

IMPLANTATION OF THE URETER INTO THE BOWEL.

Implantation into the small intestine, colon, and rectum has been studied experimentally by Rosenberg, Novaro, Morestin, Tuffier, Gluck and Zeller, Harvey Reed, Van Hook, and others. The technical difficulties of this procedure have been fairly well overcome, but there seems to be a serious objection to this plan of implantation on account of the liability to infection of the ureter and kidney by intestinal microbes, and also because of some tendency to constriction at the place of implantation. Van Hook found both these conditions present as early as ten days

after the operation; Reed⁵⁷ found acute nephritis in one dog killed twenty-four days after the operation, but in another similar case the kidney was apparently healthy.

In man the implantation suggested by Roux was tried unsuccessfully by Simon, but successfully according to Rosenberg,⁵⁹ by Chaput¹² in two cases. Chaput has recently published the following case:

CHAPUT'S CASE.—In a case of uretero-vaginal fistula following vaginal extirpation of the uterus, he implanted the ureter into the colon. He made a laparotomy, divided the peritoneum on the posterior wall, isolated the ureter, divided it transversely, and fixed its renal end into the colon by a double row of step sutures. The vesical end of the ureter was ligated. The patient recovered, and was well satisfied with her condition. She was obliged to void mixed urine and faeces three or four times a day. Five months after the operation there were no signs of infection of the kidney.

Van Hook condemns the operation very strongly on account of the liability to infection, and he is undoubtedly right. The bowel therefore should never be chosen when it is possible to implant the ureter into the bladder. If this be impossible on account of defect in the ureter, it is still an open question whether or not implantation into the colon should be tried before resorting to implantation on the skin in the lumbar region or abdominal wall, or nephrectomy.

IMPLANTATION OF THE URETER ON THE SKIN.

Le Dentu¹⁸ was the first to implant the ureter on the skin for anuria in a case of absolute impermeability from cancer in the small pelvis. The symptoms were relieved, but the patient died thirteen days later from cancerous cachexia. This case, however, established the operation as an effective procedure to be employed in combating anuria due to incurable mechanical causes, as it at least prolonged life.

Pozzi,⁵⁴ in the removal of a retroperitoneal parovarian cyst by laparotomy, divided the ureter at about its middle. The upper end was dissected out for five or six centimetres, and implanted

into the skin in the lumbar region through a button-hole opening. The distal portion of the ureter was sutured to the lower end of the abdominal wound. The patient recovered from the operation, and three months later nephrectomy was resorted to, which was followed by recovery. Microscopical examination of the kidney showed that it was healthy with the exception of a few small islands of interstitial nephritis. No septic invasion had taken place, as no micro-organisms were found. The integrity of the kidney in this case, after so long a period of exposure through the open ureter, is remarkable, and according to Albarran due to the antiseptic precautions in the after-treatment. This case was one in which uretero-ureterostomy might have been performed with advantage.

Losses of substance of the ureter, too extensive to permit of uretero-ureterostomy, or located too high up to permit of implantation of the upper end into the bladder, will require either implantation on the skin or into the bowel. As both of these methods are objectionable on account of the liability to infection sooner or later and the consequent necessity of nephrectomy, operative procedures to effect a connection with the bladder have been proposed by Rydygier⁶¹ and Van Hook from dissections on the cadaver.

Rydygier proposes to implant the two ends of the ureter on the abdominal wall, and by plastic operation to make a channel of skin between them to make good the loss of substance of the ureter.

Van Hook proposes by plastic operation on the bladder to create a diverticulum long enough to meet the upper end of the ureter.

In both of these methods it is proposed to place these newly-formed channels in the abdominal wall. Theoretically these methods appear feasible, but they have not as yet been practised in animals or the human subject.

Reichel⁵⁸ reports the following unique case of ureter in an inguinal hernia:

REICHEL'S CASE.—Boy, aged nine and a half years; movable right inguino-scrotal hernia for four and a half years. Herniotomy

revealed small sac containing a little water. Behind this was another tortuous sac adherent to its surroundings. This was the ureter. Incision of sac. Palpation revealed a canal narrow down into the bladder but dilated up to the kidney,—a hydronephrosis. Extra-peritoneal nephrectomy seven days later. Recovery.

CONCLUSIONS.

Accidental wounds and subcutaneous ruptures of the ureter have not as yet been objects of direct surgical procedure upon the ureter at the seat of lesion. It will be advisable, however, when and as soon as the diagnosis can be made, or when lumbar opening of a peri-ureteral cavity containing extravasated urine is made, to look for the seat of rupture, and, if practicable, to restore the continuity of the canal.

Catheterization of the ureters from the bladder for purposes of diagnosis of diseases of the kidneys has given valuable information affecting the decision for or against operation on the kidney. The procedure is reasonably practicable in the female by the methods developed by Simon, Pawlik, and Kelly.

In man, catheterization is practicable only through epicystotomy. The danger of this operation is steadily decreasing. The old mortality, which varied from 27 to 20 per cent., has been reduced in the more recent series of operations (Ultzmann). Albert has had 20 cases with 1 death; Assandelft, 102 cases with 2 deaths; Ultzmann, 9 cases with 1 death; Bergman, 10 cases; Von Itersen, 12 cases; Trendelenburg, 6 cases; and Antal, 8 cases, all without a death. Therefore this procedure is justifiable in selected cases.

Catheterization of the ureter from the bladder as a curative measure for the evacuation of hydro- or pyonephrosis has occasionally been performed successfully (Pawlik). It is more difficult and more uncertain than nephrotomy, and the attempt to find and remedy the stenosis of the ureter from the pelvis of the kidney.

Dilatation of strictures of the female ureter by elastic bougies or catheters has been tried from the bladder by Kelly with temporary success, and from the pelvis of the kidney by

Alsberg successfully. Consequently this procedure is of use in isolated cases.

Permanent catheterization of the ureter from the bladder, a fistula, or an implanted ureter is often tolerated only for a limited time, and must be employed with caution for fear of causing ureteritis.

Uretero-lithotomy, longitudinal incision over a stone for its removal is a safe operation by the extraperitoneal method. The wound heals without stenosis. In extraperitoneal operations suturing is unnecessary. Drainage down to the wound is sufficient.

Intraperitoneal ureterotomy should be done only when access outside of the peritoneal cavity is impossible, and should be completed by careful suturing, covering with a peritoneal or omental flap and drainage.

Opening of the peritoneal cavity to locate the seat of the stone may occasionally be necessary, but when the diagnosis is once made, ureterotomy for the removal of the stone should be done through an extraperitoneal incision, and the abdomen closed.

In valve-formation or stricture of the ureter, causing pyo- or hydronephrosis, or a permanent renal fistula, nephrotomy should be followed by exploration of the ureter in its entire course from the kidney to the bladder.

Exploration of the ureter as to its permeability should be done from the renal wound by a long, flexible silver probe—a uterine probe—or an elastic bougie, either olive-pointed or not. If the bougie passes into the bladder, the examination is at an end. The size of bougie that will pass through a healthy ureter is from 9 to 12, French scale.

If the pelvic orifice of the ureter cannot be found from the renal wound, it should be sought for by opening the pelvis, pyelotomy, or by incising the ureter, ureterotomy.

A longitudinal incision, half an inch to an inch long, in the posterior wall of the pelvis, can be made while the kidney is lifted upon and against the twelfth rib. This procedure is easy if the pelvis is dilated, but may be impossible if the pelvis is of normal size.

Operation for valve-formation should be done through the

wound in the pelvis. If the opening cannot be seen or found from the pelvis, ureterotomy should be performed immediately below the pelvis, a small incision should be made in the ureter, and a probe passed up into the pelvis. The valve should be split longitudinally, and the incised borders so treated as to prevent reformation of the valve.

A stricture in the ureter, if not too extensive, can be treated by a plastic operation on the plan of the Heinecke-Mikulicz operation for stenosis of the pylorus,—namely, longitudinal division of the stricture and transverse union of the longitudinal wound. This method of operating for ureteral stricture seems to me preferable to resection of the strictured part of the ureter (Küster's operation) for the following reason: It is a more economical operation and preferable when the elongation of the ureter is not sufficient to permit the two cut ends of the ureter, after excision of the stricture, not only to come in contact, but even to permit of closure by invagination without stretching.

Resection of the upper end of the ureter, and implantation of the distal end into the pelvis may be useful in rupture or division or stricture of the upper end of the ureter, as described by Küster.

In a similar case of stricture in the upper end of the ureter, especially if the ureter were not elongated or the kidney movable, I should prefer the plastic operation proposed by me, as it is easier of technique, and as it proved successful in my case of traumatic stricture in the ureter below the pelvic orifice.

The ureter is accessible through an extraperitoneal incision, a continuation of the oblique incision for lumbar nephrotomy, from the twelfth rib down along and one inch anterior to the ilium and along Poupart's ligament to about its middle. This incision gives access to the upper three-fourths of the ureter and down to within two to three inches above the bladder.

The vesical and lower pelvic portions of the ureter may be reached, as Cabot has pointed out, by means of the sacral operation, or Kraske's method modified by osteoplastic, temporary resection of the sacrum. In woman the vesical portion of the ureter is accessible through the vagina.

The vesical orifice of the ureter may be reached from within the bladder by suprapubic cystotomy in man or by dilatation of the urethra, suprapubic, or vaginal cystotomy in woman.

Uretero-uterine fistulas can be treated satisfactorily by plastic closure of the vagina or nephrectomy. Implantation of the ureter into the bladder is, under favorable circumstances, the operation of the future for this condition.

Uretero-vaginal fistulas and congenital urethral or vaginal terminations of the ureter should be treated by vaginal plastic operation for displacement of the proximal end of the ureter into the bladder. If these attempts fail, and the kidney is not infected, extra- or transperitoneal implantation into the bladder should be done, and finally, as a last resort, nephrectomy.

Complete transverse wounds in the continuity of the ureter should be treated by uretero-ureterostomy, after Van Hook's method of lateral implantation if possible.

Complete transverse wounds of the upper end of the ureter should be treated by implantation of the ureter into the pelvis of the kidney, as devised by Küster.

Complete transverse wounds of the ureter near the bladder should be treated by implantation into that viscus either by splitting the ureter or by invagination.

Loss of substance of the ureter too extensive to permit of uretero-ureterostomy, or too high up to permit of implantation into the bladder, may be treated by implantation on the skin or into the bowel.

Implantation into the bowel is objectionable on account of the infection which is almost certain to follow sooner or later.

Implantation on the skin in the lumbar region or the abdominal wall may have to be followed by secondary nephrectomy, which, however, is much less dangerous than the primary operation.

Implantation into the rectum should not be resorted to when implantation into the bladder is possible.

BIBLIOGRAPHY.

- (1) *Albarran and Lluria*: Comptes-Rendus de la Société de Biologie, 1891, Vol. III, No. 24, p. 543, and No. 26, p. 587.
- (2) *Allingham*: British Medical Journal, March 28, 1891.
- (3) *Alsberg*: Verhandlungen der deutschen Gesellschaft für Chirurgie, XXI Congress, 1892, p. 43.
- (4) *Bandl*: Wiener medizinische Wochenschrift, 1877, Nos. 30 and 32.
- (5) *Baumm*: Centralblatt für Gynäkologie, 1892, No. 17, p. 336.
- (6) *Berg, J.*: Hygiea, Band LI, 1889, No. 7, p. 144.
- (7) *Bloodgood*: ANNALS OF SURGERY, January, 1894, p. 77.
- (8) *Bois (d'Aurillac)*: Bulletins et Mémoires de la Société de Chirurgie de Paris, Tome XIX, p. 371.
- (9) *Cabot, A. T.*: American Journal of the Medical Sciences, January, 1892, p. 43.
- (10) *Cabot, A. T.*: Boston Medical and Surgical Journal, December 25, 1890.
- (11) *Ceci*: La Riforma Medica, September 5, 1887.
- (12) *Chaput*: Bulletins et Memoires de la Société de Chirurgie de Paris, Tome XIX, p. 309.
- (13) *Crampton, Sir P.*: Medico-Chirurgical Transactions, Vol. XVI, p. 162. Cited from Page.
- (14) *Cullingworth, C. J.*: Transactions London Pathological Society, Vol. XXXVI, 1885, p. 278.
- (15) *Davenport, T. H.*: Boston Medical and Surgical Journal, October 30, 1890.
- (16) *Delbet*: Annales des Maladies des Organes génito-urinaires, 1891, p. 246.
- (17) *Le Dentu, A.*: Affections chirurgicales des Reins, des Urétères et des Capsules surrénales, Paris, 1889.
- (18) *Le Dentu, A.*: Congrès Français de Chirurgie, 1889, p. 533.
- (19) *Emmet, T. A.*: Principles and Practice of Gynecology, 1884.
- (20) *Fenger, C.*: Chicago Medical Recorder, March, 1893.
- (21) *Fenger, C.*: Journal American Medical Association, March 10, 1894.
- (22) *Geyl, Arie*: Volkmann's Sammlung klinischer Vorträge, No. 37, 1892, p. 311.
- (23) *Guyon*: Cited from Tuffier, Op. cit., p. 520.
- (24) *Guyon*: Cited by Albarran and Lluria.
- (25) *Hahn*: Berliner klinische Wochenschrift, No. 27, 1879.
- (26) *Hall, R. B.*: Medical Record, New York, October 18, 1890, p. 430.
- (27) *Hallé, N.*: Urétériles et Pyelites, Thèse de Paris, 1887.
- (28) *Henle, J.*: Handbuch der Eingeweidelehre des Menschen, Braunschweig, 1873, p. 335.
- (29) *Hyrtl*: Cited from Henle's Handbuch der Systematischen Anatomie.
- (30) *Iversen*: Centralblatt für Chirurgie, No. 16, 1888.
- (31) *Iversen*: Nordisk Medicinsk Arkiv, No. 22, 1892.
- (32) *Kaltenbach*: Cited from Iversen.
- (33) *Keen, W. W.*: Medical News, Philadelphia, April 18, 1891, p. 431.
- (34) *Kelly, H. A.*: American Journal of Obstetrics, June, 1892, p. 768.
- (35) *Kelly, H. A.*: Johns Hopkins Hospital Reports, Vol. II., p. 235.

- (36) *Kelly, H. A.*: ANNALS OF SURGERY, January, 1894, p. 70.
- (37) *Kirkham, F. W.*: Lancet, March 16, 1889, p. 525.
- (38) *Krug, Florian*: Unpublished.
- (39) *Küster, Th.*: Archiv für klinische Chirurgie, Band XLIV, Heft 4, 1892, p. 850.
- (40) *Landau*: Archiv für Gynäkologie, Band IX.
- (41) *Lane, W. Arbuthnot*: Lancet, November 8, 1890.
- (42) *Mynter, H.*: ANNALS OF SURGERY, December, 1893.
- (43) *Nebe*: Ueber Harnleiterscheidenfisteln, Inaug. Diss., Halle, 1890.
- (44) *Newman*: Glasgow Medical Journal, July, 1885.
- (45) *Novaro*: (published by Bottini), Centralblatt für Chirurgie, No. 27, 1893, p. 596.
- (46) *Page, H.*: ANNALS OF SURGERY, May, 1894, p. 513.
- (47) *Paoli and Busachi*: Annales des Maladies des Organes génito-urinaires, 1888.
- (48) *Pawlik*: Ueber der Harnleitersondirung, Archiv für klinische Chirurgie, Band XXXIII, 1886, p. 717.
- (49) *Pawlik*: cited by Albarran and Lluria.
- (50) *Penrose, C. B.*: Medical News, Philadelphia, April 28, 1894, p. 470.
- (51) *Perez*: Exploration des Urétères, Thèse de Paris, No. 302.
- (52) *Poirier*: Cited from Le Dentu.
- (53) *Poirier*: Discussion of Albarran's and Lluria's paper.
- (54) *Pozzi, S.*: Congrès Français de Chirurgie, 1891, p. 606.
- (55) *Pozzi, S.*: Medical and Surgical Gynæcology, Vol. II, p. 328.
- (56) *Ralfe and Godlee*: Clinical Society of London, February 22, 1889, cited from Cabot.
- (57) *Reed, R. H.*: ANNALS OF SURGERY, September, 1892.
- (58) *Reichel, P.*: Verhandlungen der deutschen Gesellschaft für Chirurgie, 1892, Vol. II, p. 68.
- (59) *Rosenberg*: Virchow's Archiv, Band CXXXII, Heft I, p. 158.
- (60) *Rovsing, Th.*: Om Blaerebetaendelsernes Ætiologi, Pathogenese og Behandling, Copenhagen, 1889.
- (61) *Rydygier, L.*: Uretero-plasty, Oest.-Ungarisches Centralblatt für Medizinische Wissenschaft, 1892.
- (62) *Sands*: Cited from Le Dentu.
- (63) *Schede*: Centralblatt für Gynäkologie, No. 23, 1881.
- (64) *Schopf, F.*: Centralblatt für Gynäkologie, No. 30, 1887.
- (65) *Secheyron, L.*: Archives de Tocologie, 1889, p. 254.
- (66) *Silbermann*: Cited from Le Dentu.
- (67) *Simon*: Chirurgie der Nieren, Vol. II, Stuttgart, 1876.
- (68) *Simon*: Wiener Medizinische Wochenschrift, No. 28, 1876.
- (69) *Tanquary, W. M.*: Cited by Van Hook.
- (70) *Tourneur*: De l'Urétérisme et de la Periurétérisme, Thèse de Paris, 1886.
- (71) *Trendelenburg, F.*: Volkmann's Sammlung klinischer Vorträge, No. 355, 1890, p. 3308.
- (72) *Tuchmann*: Virchow-Hirsch Jahresbericht, 1874, Band II, p. 282.
- (73) *Tuffier, Th.*: Appareil Urinaire, Duplay and Réclus, Traité de Chirurgie, Vol. VII, Paris, 1892.

- (74) *Tuffier, Th.*: Études expérimentales sur la Chirurgie du Rein, Paris, 1889, p. 165.
- (75) *Twynam*: Transactions Clinical Society of London, Vol. XXIII, 1890.
- (76) *Ulltzmänn, R.*: Die Krankheiten der Harnblase, Deutsche Chirurgie; Lieferung 52, p. 290.
- (77) *Van Hook, W.*: Journal Americal Medical Association, December 16 and 23, 1893.
- (78) *Weil*: Centralblatt für Gynäkologie, No. 1, 1893, p. 14.
- (79) *Weir*: Cited from Le Dentu.

VIEW OF THE RESULTS THUS FAR OBTAINED ARE
BY THE USE OF ABSORBABLE PLATES IN
EFFECTING VISCERAL APPROXIMATION.

By WILLIAM S. MAGILL, M.D.,

OF CHICAGO.

SEVEN years have passed since the first operation of Professor Senn, of intestinal anastomosis with absorbable plates.

The efforts of Jessett have widely introduced the method in England. But in spite of the brilliant operation of Von Baračz and his long experimentation and enthusiastic support of this operation, the use of absorbable plates has made little progress on the continent of Europe.

During a recent residence in Paris I sought the reason for this neglect, and concluded that the predominating influence of Billroth and his assistants was sufficient to keep the attention of German surgeons fixed on methods of suture. In France the remarkable skill of Terrier in the use of sutures served also to keep the attention of French surgeons away from other methods. Moreover, Senn's method was unfavorably criticised by a young French surgeon who, without experimentation of any value, did not hesitate to pronounce against the method for reasons so futile that one cannot understand their acceptance by his readers. With the exception of Pierre Delbet, I know of no surgeon in Paris who has experimented with Senn's plates.

Von Baračz had published for German readers the experimentation and technique of the use of absorbable plates. Mayo Robson and Chalot furnished sufficient technical direction for French readers. That which seemed lacking in the medical literature of this subject, was a critical study of Senn's method with special attention to its clinical results and their exposition

in a brief and forcible way. This was the object of my inaugural thesis at Paris, and it needed only the support given by Professor Terrier to bring Senn's method into notice there.

Since the publication of that monograph, several other cases have come to my knowledge. A recent statistical table, published by Dr. Murphy in the *Medical Record*, is incomplete and fails to present to the public the real status of Senn's method. These facts, and another that the preceding study was in French, in book-form, and not in circulation, led me to think that it might be interesting to publish this review of the clinical results of intestinal anastomosis with absorbable plates. The *ANNALS OF SURGERY* gave us Senn's method in 1888, and it seems fitting that its results be given in the same publication.

Since 1887 the reports of eighty-seven operations have been found. The plates have been modified by Mayo Robson, by the insertion of a decalcified bone tube to keep open the incision of the gut. Von Baračz, Heigl, and Butz, following the suggestion of Dawbarn for a vegetable plate, have operated with plates of raw turnip, but all of these modifications retain the fundamental principle of Senn, to use for anastomosis two plane surfaces which, inserted by the incisions of the intestine, would keep in contact the serous surfaces until their adhesion be assured, when the plates would be absorbed by digestive processes. All cases operated by such means should be considered as included by Senn's method. Catgut (no plane surfaces), rubber, etc. (not absorbable), cannot be included in this study, for they violate one head or the other of Senn's fundamental idea.

Some modifications in size and material of the plates and certain differences in operating may justify a brief technical description of plates and method.

ABSORBABLE PLATES.

Two substances seem to be well adapted for this purpose,—*i.e.*, decalcified bone and raw turnip. The bone-plates are well known and experimented, their only objection is the time required for their preparation, for few dealers keep them on hand. Raw turnip seems to give as good results; plates can be instantly made

from this material, and are more pliable than bone, easier to preserve, and better brought together in making the anastomosis, slipping much less. The making of both will be described.

Decalcified Bone Plates (Senn).—The compact tissue of a large beef bone is cut into oval plates 7 centimetres long, 3 centimetres wide, and 5 millimetres thick. These are put into a 10-per-cent. solution of hydrochloric acid for decalcification, solution changed every twenty-four hours until the plates can be bent in all directions without fracturing, wash in a potash solution to remove excess of acid. With a knife make an elliptical opening in the centre 3 centimetres long, 7.5 millimetres wide. At each extremity and in the middle of each side punch a hole in the bone near the internal orifice. A needle threaded with a double thread of silk is passed through the hole at one extremity and brought out through the hole at one side. One end of the thread is withdrawn from the first hole and passed through the hole at the other end. A repetition of this process for the other side of the plate gives a double thread from each hole, the laterals armed with needles. A second plate like the first completes the necessary pair. Preserve in a solution of equal parts of alcohol, glycerine, and water.

Vegetable Plates—Turnip (Von Baračz).—With a broad knife cut slices of raw turnip 5 millimetres thick. Shape out elliptical plates 7.5 centimetres long, 3.5 centimetres wide, and cut an internal opening 3 centimetres long, 7.5 millimetres wide. Punch holes, and pass the threads in the way described for the bone plates. Preserve as long as desired in a 1-per-cent. solution of carbolic acid, which hardens the plates a little.

Instruments.—The instruments necessary for an abdominal incision: a needle for intestinal suture, compression forceps, or elastic bands, if the operator does not prefer to use gauze strips or the fingers of an aid to isolate the intestine.

The Patient.—By far the greater number of patients operated by Senn's method were forced to gastro-enterostomy to alleviate pyloric stenosis. Most writers recommend the preparation of the patient several days before the operation, milk diet, rectal feeding, washing of the stomach morning and evening with an antiseptic

solution, etc. It is our opinion, confirmed by the experience of others as well as our own, that this period of preparation should be short. Washing of the stomach, rectal feeding, the vomiting which persists in spite of milk diet and washing, all of these enfeebling elements could be eliminated by immediate operation, which, establishing the permeability of the digestive tract, puts the patient in the best condition for recovery. *The preparation of the patient should be limited to the precautions necessary for abdominal incision, in all cases where time is to be considered.*

Anæsthesia.—The choice of an anæsthetic is important, all vomiting during the anæsthesia should be avoided, the length of the operation and the condition of the patient should enter into account.

Ether is liable to allow vomiting. Chloroform tends to prolong the post-operative period which precedes the awakening. The depressed condition of the patient indicates particularly the mixed method, ethyl bromide followed by chloroform, which stimulates the patient, assures an anæsthesia free from vomiting, a rapid return to consciousness, necessitating the absorption of only small quantities of the toxic agent.

A reference to the recent contributions to the literature of this subject will show to what extent post-operative vomiting is suppressed by this method of rapid anæsthesia.

Operation.—A gastro-enterostomy will be described, as this operation has been more frequently done than any other with absorbable plates, and its description will be sufficient to render any intestinal anastomosis easily understood.

The unconscious patient placed upon the table, the asepsis of the site of operation is assured by toilet and sterilized towels. Incision on the median line between the ensiform cartilage and the umbilicus, to be carried farther down according to the indications of the case or the habit of the operator. The peritoneum opened after complete hæmostasis, the right hand introduced into the abdomen explores the region and determines the nature of the operation. Gastro-enterostomy decided upon, push to the right the omentum and small intestine, the right hand profoundly introduced searches the origin of the jejunum at its fixed point

to the left of the spinal column, descending slightly on the jejunum, a coil of it is thus made and brought around the left border of the omentum. Empty the coil of its contents by gentle pressure with the fingers, assuring a length of fifteen centimetres against any reflux of intestinal contents (clamps, bands, or fingers of an aid).

Surround the parts with sterilized towels, and incise the bowel opposite its mesentery insertion longitudinally of sufficient length to admit, when slightly stretched, the smaller diameter of the plate (three centimetres). Introduce the plate by sliding gently. Pass the needles of the lateral threads through all of the intestinal coats, passing from within the bowel to the outside near the edge of the incision, half-way from its extremities. Bring the terminal threads into the angles of the incision. Cover all with a sterilized towel and pass it to the aid to hold in the inferior part of the abdominal wound. Bring the stomach, more or less dilated, into the incision of the abdomen, surround with sterilized towels, cut into the anterior wall of the stomach, making an incision three centimetres long parallel to the inferior border at a few centimetres distance, terminating the incision near the pylorus, at least five centimetres from any malignant growth. If necessary empty the stomach of its contents by this incision (aspiration might be preferred). A running thread of fine catgut stitched over the edges of the incision serves to prevent a hernia of the mucosa, and stop any bleeding which frequently accompanies it. Slide the plate into this, *using no force*. Pass the threads as before, scarify lightly the serous surfaces. Complete the toilet of the parts, making sure that the peristaltic action of the intestine corresponds with the muscular contraction of the stomach, bring the plates together, tie the posterior threads, the terminals and the anterior last, drawing each knot sufficiently to maintain the contact complete, without interfering with the circulation; the thread ends cut close to the knots, be sure that the edges of the intestinal wound are entirely concealed between the plates where the knots themselves should be pushed with a director. Supplementary sutures are rarely necessary, but serve to prevent slipping of the plates, and assure the surgeon who makes his first

acquaintance with the method. Consequently some sero-serous sutures may be placed around the edges of the coapted plates, from three to six with fine silk are mentioned in the reported cases.

The approximation is complete. Let the parts drop into place after their toilet, remove all towels, and close the abdomen, sewing the peritoneum with lock-stitches of fine silk, the muscular sheath with a running silk thread, the skin with single stitches of silkworm gut. Dress with an aseptic towel, covered with sterilized cotton, slightly compressed with a flannel bandage.

The patient should have already awakened, and a rapid reaction against shock is to be desired.

Post-operative Treatment.—Avoid narcotics, sustain the patient by rectal feeding, stimulants per rectum if necessary. Senn recommends feeding liquids by the mouth after forty-eight hours; simple nourishment at the end of a week. His precaution to keep the patient in bed a month will not be necessary if the abdomen is closed as directed. Hundreds of laparotomies terminated by Professor Terrier in this way have shown no tendency to ventral hernia.

It is our opinion that great importance should be given to prompt feeding by the mouth, the more so that no accident of this origin is found in any of the reported cases, and several of the surgeons express their conviction that the death of their patient was due to insufficient alimentation, and might have been avoided by prompt feeding. Other surgeons confirm by their successes the immense advantage of rapid nourishment in the normal condition. It should be remembered that the stomach has lost much of its digestive power, and can only handle small quantities at a time, but frequently administered. A little care will avoid any over-feeding and consequent trouble of indigestion.

Mortality Statistics.—The general mortality of eighty-seven operations by Senn's method is 23.10 per cent.

Sixty-one gastro-enterostomies give 14 deaths, a mortality of 22.95 per cent., about the same as the general mortality. Sixty-

one operations by 34 different surgeons, 5 successes without details. Fifty-eight gastro-enterostomies for cancer of the pylorus, and 3 for non-malignant stenosis. Eighteen cases of gastro-enterostomy, the patient a female, resulted fatally only twice, a mortality of only 11.11 per cent. Remark: this female mortality is less than one-half of the mortality of the operation.

The youngest patient operated was twenty years old, and the oldest patient seventy-one, both males.

Deaths.—Of the fourteen deaths, *one* is reported by Jessett without details. A woman, fifty-three years old, operated in January, 1893, for cancer of the pylorus. *Five deaths* followed the operation in from two to twenty-five hours time. Once from intense shock, fatal result five hours after operation, the *post-mortem* showed the perfect condition of the anastomosis, the adhesion already so firm that considerable hydraulic pressure failed to produce a leak.

Four deaths, at two, eight, twelve, and twenty-five hours that followed the operation, are the result of cases operated *in extremis*, the fatal termination to have been expected.

Six deaths occurred between the third and sixth day. One of these was due to the surgeon's self-acknowledged fault in postponing nourishment too long. The *post-mortem* demonstrated the perfect condition of the anastomosis.

For the remaining five deaths of this series, the post-mortem revealed the good condition of the abdomen and anastomosis. But the extreme cachexia of the patients seemed to prevent their deriving any benefit from the operation, other than the alleviation of their symptoms, death intervening without complications of any kind; in one case the temperature remaining subnormal during the entire six days of the patient's survival of the operation.

There remain *two* deaths which were caused by peritonitis. One death in the hands of Jessett. The patient was operated in a common ward, and died ten days later of peritonitis, a septic infection of external origin at the time of operation. The *post-mortem* showed the anastomosis to be in good condition, and the operator accuses himself for this infection, having, in disobe-

dience to his regulations, operated in a room that could not be aseptic.

The other death from peritonitis comes from Senn himself,—a patient operated in December, 1888. The anastomosis was made with dry plates of decalcified bone. The temperature, normal until the fifth day, rose that evening to 101° F. to 104° F. the next morning, resulting in death at noon. "The *post-mortem* revealed a minute perforation at the upper border of the approximation plates." The dry plates softened by the animal liquids had swollen considerably, adhesions quite firm between the stomach and the intestine. Peritonitis limited to the upper portion of the abdomen.

Since this time only moist plates have been recommended, and have never given rise to such an accident.

Of sixty-one gastro-enterostomies only *one death* has occurred from *insufficient approximation*. This fault was during the experimental stage, before the perfection of the details of the method. The cause of the accident was immediately recognized and corrected; fifty-six operations since the 1st of January, 1889, where moist plates were used, have not once revealed a fault of approximation.

No method of suture ever gave such a remarkable result.

Billroth's statistics of gastro-enterostomy, published in 1891, give 28 operations, 14 deaths; mortality 50 per cent. More than double that of Senn's method in the hands of 34 *different operators*, many of them trying the approximation for the first time.

The statistics of Von Hacker, published in 1890, correspond closely with Billroth's,—21 cases; 8 operated by Wolfler's method resulted in 4 deaths; mortality 50 per cent.; 13 operated by Von Hacker's method resulted in 6 deaths; mortality 47 per cent.

Results of Successful Operations.—Forty-seven patients survived the operation of gastro-enterostomy with absorbable plates, a percentage of 77.05. Twenty of these patients are noted at various times as well and no indication of their death can be found.

A patient operated by Jessett the 12th of April, 1890, is

reported four years later in good health (personal letter). The oldest patient of the series (reported by Senn), operated at seventy-one years of age, survived the intervention 20 months.

Twenty-six of the reported cases, which note the length of survival, give an average of four months. Nine of these patients died of particular complications. One (Morison) died suddenly of syncope on the eighth day following the operation. The *post-mortem* revealed the perfect condition of the parts operated upon, no pathological explanation of the death was found. Two cases terminated fatally, on the fourteenth day (Senn) and during the seventh week (Butz) from hæmorrhage of the neoplastic mass. Two cases terminated in acute pneumonia,—Barker at six weeks, Senn, the twelfth day. One died of congestion of the lungs, at the end of a month (Beatson). The *post-mortem* of these cases showed the anastomosis in good condition.

Three died of insufficient alimentation due to obstruction, more or less complete, of the digestive canal. One in three weeks' time (Senn). At the *post-mortem* the anastomosis was found without leakage, but a coil lay down on the small intestine had been used for the approximation and united to the stomach, reversing the peristaltic action which caused accumulation of matter in the eliminated coils, the obstruction of the opening into the free intestine, rupture of the over-distended coil resulting in death. This was Senn's third operation and showed the danger of Leucke's advice to seize and anastomose the first coil attainable, regardless of its situation. A *second* died at the end of a month, the surgeon (Clarke) *supposing* an occlusion of the orifice. The symptoms are difficult to explain, the supposed stoppage having appeared suddenly. No *post-mortem* was made, and an unanswered interrogation is all that remains of this case. A *third* terminated fatally five months after operation. This is the case reported by Larkin which excited much discussion in England. The clinical report of the case operated in May, 1891, was published as a complete success. Three months later the patient manifested symptoms of occlusion, and Larkin, imagining a closure of the artificial opening of the stomach, im-

mediately performed a jejunostomy of so little use that the patient refused to maintain the fistula, preferring alimentation by the mouth. Death from progressive marasmus the 26th of October, 1891. The post-mortem showed that the small intestine had passed through the opening made in the omentum in performing the anastomosis, an intestinal occlusion caused by bands had stopped all alimentation of the patient. The orifice of the pylorus was largely permeable, the artificial opening narrowed but also permeable. Evidently the calibre of the two outlets of the stomach was amply sufficient for alimentation. It is probable that the cause of all trouble came from the strangling of the intestine. Larkin refuses to admit this and accuses the narrowing of the artificial opening.

Three cases are reported in which the artificial opening was found completely closed. The case of McFarlane notes without details the death seven months after operation, the post-mortem revealing the complete obliteration of the gastro-intestinal orifice. Hawkins also gives few details, seven months after operation, during which time the symptoms of stenosis had ceased entirely, the patient commenced vomiting and died nineteen days later. The post-mortem revealed a cancerous infiltration of the stomach walls, the duodenum and the pancreas. The report fails to state whether the obliteration of the opening of the anastomosis was caused by the growth or not. Stansfield reports the *third* case. Two months after operation the symptoms recommenced and continued until death, four months after the operation. The post-mortem showed a complete obliteration of the orifice, a cancerous infiltration of the region, with secondary deposits in the liver.

In these three cases it is scarcely probable that the obliteration of the orifice shortened life to any great extent, the infiltration marking so advanced a condition of disease that a long survival could scarcely have been expected.

The narrowing of the opening constitutes the serious and almost unique objection to Senn's method. That this cicatricial retraction is not confined to approximation by plates can be answered with perfect truthfulness, and a case of Mayo Robson's furnishes an apt illustration. The patient, operated the 25th of

June, 1891, for cancer of the pylorus, pylorotomy by method of sutures, recurrence of symptoms of stenosis, and second operation in August, 1891, when the artificial pyloric orifice was found narrowed to an extreme degree, the extremity of the finger inadmissible. Consequently a gastro-enterostomy was made, this time with the use of approximation plates.

The retraction of the orifice is the natural result of the normal contraction of fibrous tissue and cannot be charged to any particular method. To prevent retraction of the artificial opening becoming troublesome is aimed at by Senn and others in their use of larger plates. Mayo Robson proposes the insertion of a decalcified bone tube to assure the separation of the edges of the incised bowel. Both of these suggestions may be of value. Plates can be used of any length and thus obtain enormous openings such as are proposed by Abbe, but these have their inconveniences. It is our opinion that modification will scarcely be needed, the rarity of the accident and its possible occurrence perhaps limited to pathological tissue rendering such precautions unnecessary. It is noteworthy that no case of retracted orifice is reported for anastomosis limited to the intestine. We should prefer to operate taking the risk of subsequent contraction, free to create a second anastomotic opening should the recurrence of the symptoms necessitate such action. It is remarkable that the surgeons who have performed such operations frequently—Senn and Jessett—have had no such accident. Could a supposition of faulty technique be made?

Admitting the contraction as a natural result of cicatrization, Murphy has sought to reduce the amount of contraction to a minimum by shortening the distance separating the approximated surfaces, thus obtaining a limited area of fibrous tissue. To what extent his button realizes this end can be found elsewhere and is not a part of this review.

We have thought that this secondary stricture, analogous to that of the urethra, might result from the same causes, lesion of the mucosa, infection, ulceration, cicatricial reparation, and slow contraction of the fibrous formation. Histological examination in several cases of experimental cicatrization seems to confirm our belief.

Should infection at the point of union hinder the formation of a linear cicatrix, the utility of intestinal asepsis, maintained throughout the cicatrization, would be evident and should be tried.

Pylorectomy.—Three operations of pylorectomy have been performed with the aid of approximation plates. Murphy, in his statistical table, only mentions one.

Jessett and Morison followed Senn's advice, after excision of the tumor, closing the ends of the stomach and duodenum with a row of sutures passed through all the coats of these organs, inversion of the stitched ends, and a row of sero-serous sutures added to maintain this position. They then performed a gastro-jejunosotomy as described precedingly.

Rawdon pursued another line of conduct. The tumor excised, the upper part of the incised stomach closed with two rows of stitches; by cutting one of the bone plates into circular form he inserted it, perpendicularly to the axis of the bowel, in the cut end of the duodenum, the tunics of the intestine reverted on the plate were fixed there by the plate threads; the second plate inserted in a similar manner in the unclosed portion of the incision of the stomach, the approximation was easily completed, thus accomplishing a terminal gastroduodenostomy,—end-to-end approximation. His success recommends this procedure in cases where a sufficient length of duodenum remains, allowing its juxtaposition to the stomach.

Three operations by three different surgeons, one death, two *still living*.

Jessett reports his patient, operated August 4, 1891, to be in fine health, with no trace of existing malignant disease. (Personal letter.)

One death in three cases would give a mortality of $33\frac{1}{3}$ per cent. But the peculiar circumstances which accompanied the loss of Morison's patient do not allow the incrimination of the operation. The patient, a man sixty-five years old, operated on March 3, was progressing very favorably until the night of March 6, when he was taken with an attack of dyspnœa accompanied by syncope. Recovering from this, he drank a glass of milk

without any difficulty, said that he had had similar attacks at his home before. The next afternoon he died suddenly, of cardiac syncope, at half-past three.

Post-mortem.—All the wounds united and healthy; *no peritonitis*; stomach empty; plates loose; one in the stomach little altered, the other in the ileum two feet from the ileo-cæcal valve, and partly digested. Cause of death not found. *The good condition* of the operated parts and the *favorable progress* of the patient, aside from syncope, justify the assertion that *Senn's method used three times for pylorotomy* has never given rise to an accident attributable to the operation, and, therefore, rests irrefragable. *No method of sutures can compare with this result.*

Cholecystenterostomy.—Chavasse used absorbable plates for a cholecystocolostomy to cure a biliary fistula of long persistence. The operation performed in October, 1891, was a complete success, and this surgeon praises Senn's method as facilitating greatly the anastomosis of the gall-bladder with the colon.

A cholecystocolostomy, instead of an anastomosis of the gall-bladder with the highest part possible of the small intestine, might be severely criticised. The excuse offered by Chavasse, of facility and that the patient was accustomed to the absence of biliary matter in the small intestine, ought not to be considered. Abbe, however, fails to point out its defects in his recent article on the surgery of the gall-bladder.

Mayo Robson used his modified Senn's plates for a cholecystenterostomy for biliary fistula. The patient, a woman, L. P., sixty-five years old, made a complete recovery. Operated on September 21, 1893, she is now in good health.

Two operations with approximation plates applied to the surgery of the gall-bladder give complete success in each case, and both operators point out the advantages of Senn's method.

Ileo-ileostomy.—Analyzing the remaining cases where absorbable plates have been used, we find nine cases of ileo-ileostomy after excision of the small intestine: twice for cicatricial stenosis with two successes; once for fæcal fistula created for gangrene of strangled hernia, success; once for traumatic rupture of the intestine, a kick from a horse received in the abdomen, rupture of

the small intestine in three places, excision of thirty-nine inches, the anastomosis was made in contused tissue, which the surgeon declares ought not to have been left in the abdomen, the fatal result was due to the giving away of this bruised intestinal coat, *a fault of too little excision*, not of the approximation.

Five cases of immediate excision for gangrened hernia give three successes and two deaths. The death in one case also resulted from an insufficient excision, for which the surgeon accuses himself, but is partly excused by the desperate condition of the patient at the time of the operation, a condition so desperate, says the surgeon, that any other method than the rapid approximation with absorbable plates would have been impossible without leaving the patient dead on the operating-table. The second death of this series was caused by the faulty inversion of the cut end of intestine, a fault due to the inexperience of the operator.

Nine cases of ileo-ileostomy with three deaths place the mortality at $33\frac{1}{3}$ per cent.; but this will at once be seen to be due to the *condition in extremis* of the patient, or to the *fault of the operator*, not of the method. Suffice it to recall the great mortality of immediate operation of gangrenous hernia and wounds of the intestine in a condition of shock. No adverse criticism of the plate method could justly be found for these cases of ileo-ileostomy.

Colocolostomy.—This operation has twice been done with absorbable plates with complete success. The first was done by Abbe,—an anastomosis of the ascending and transverse colon to alleviate the occlusion of a cancer at the hepatic flexure. The success was a brilliant one, but unfortunate in that it led to the proposition and adoption by the New York school of surgeons of Abbe's catgut rings.¹

The second colocolostomy, also necessitated by cancerous stenosis, was performed by Allingham with perfect success.

Ileocolostomy.—Of this operation we find six cases, four for

¹ The fearful mortality of catgut rings substituted for plates does not appear to be sufficiently known, as surgeons have employed them this year notwithstanding the fact that sixteen reported clinical cases where Abbe's rings were used give twelve deaths, *a mortality of 75 per cent.!*

occlusion caused by a cancer of the colon, one for mechanical obstruction near the cæcum, all five terminating successfully. The sixth operation was for gangrene of a hernia of the large intestine, excision and anastomosis of the large with the small intestine, after extensive ligature of mesenteric arteries, death the sixth day that followed the operation. Post-mortem demonstrated the cause to be a perforation of a coil of small intestine *not interested* in the anastomosis, but due directly to the fault of the surgeon who shut off completely all blood-supply by ligating, paying no attention to the necessity of excision of the coil that he destined to gangrene. The anastomosis in this case was found in perfect condition.

Excision of Cæcum-Ileocolostomy.—Cancer of the ileo-cæcal coil has been treated four times by excision and ileocolostomy with absorbable plates. Three of these cases recovered completely in remarkable contrast to the results of the same operation by other methods. The recent complete monograph of Dr. Baillet gives the general mortality of 26 cases of excision of the cæcum by methods other than Senn's, 26 operations for cancer, 14 deaths; mortality, 53.84 per cent. Can a more striking example of the plate method of approximation be found?

Senn reports one case of excision of the cancerous cæcum for chronic invagination, which terminated fatally. Without insisting upon the particular dangers of such cases, dangers well pointed out by Dr. Baillet, we find that in this particular operation the end of the colon insufficiently excised had opened, the stitches not holding in the softening tissues. Death from peritonitis. Here again the fault is acknowledged by the surgeon to be the incomplete excision of the diseased portion. The anastomosis was found in faultless condition.

RECAPITULATION.

	Deaths.	General Mortality.
87 operations.	20	23.10 per cent.
61 gastro-enterostomies.	14	22.95 "
3 pylorectomies.	1	33.33 "
2 cholecystenterostomies.	0	00.00 "
21 anastomosis of intestine only	5	23.80 "

Of eighty-seven operations, only one death can be attributed to the plate method, and this in the hands of the inventor, occurred from the use of dry plates in the experimental stage of this operation. Since that accident and the correction of its cause, not a single fault of approximation is found in the clinical reports.

The survivors of the other intestinal operations by Senn's method are, as far as can be learned, in actual good health.

The plates have generally been absorbed, sometimes eliminated in fragments, never having caused any trouble. The silk threads used in attaching the plates are found *in situ*, in almost every post-mortem, embedded in the tissue and unaltered, which has led to the substitution of catgut by some surgeons, the reason for which is scarcely understood, as no accident has occurred due to the presence of the threads, and silk has a decided advantage over catgut in tying, and is much easier to sterilize and preserve.

The rapidity of operation with absorbable plates is remarkable, a gastro-enterostomy in experienced hands requiring from twenty to thirty minutes only, according to clinical reports. It would seem that this vantage point has not been sufficiently insisted upon.

CONCLUSIONS.

The superiority of visceral approximation with absorbable plates is clinically established when compared with methods of suture, and should cause their rejection.

The rapidity of plate approximation makes a different operation of pylorotomy than when it was performed with sutures. Its possibilities are therefore much greater.

The successes of this operation by Senn's method, the different prognosis for the survivors should push the surgeon to pylorotomy rather than to gastro-enterostomy.

The brilliant results of Senn's method have changed the indications of treatment of visceral stenosis. The safety of operation is *assured*. The duty of the physician to give his patient the benefit of an operation becomes imperative. The family doc-

tor is responsible for the delivery of the case to the surgeon in such time that the patient's condition be good enough to strike out of subsequent statistics all deaths from "shock" and "marasmus," that the mortality of visceral approximation for cancer be reduced to zero.

Appended are statistical and bibliographical tables.

A complete bibliography of the experimentation, statistical discussion, and technique of Senn's methods was published in the inaugural thesis of the author, and will not be reproduced here, as it would be of little interest to the general reader.

GASTRO-ENTEROSTOMY.

Surgeon.	Sex. Age.	Survival.	Time from Operation to Death.	Remarks.
Allingham	W. 47	5 mos.	. . . .	Died from progress of disease.
Atkinson	W. 45	. . . .	. . . .	Left hospital at end of one month.
Battle	?	4 mos.	. . . .	Died from progress of disease.
Barker	M. 55	1½ mos.	. . . .	" " acute pneumonia.
Beatson	M. 45	. . . .	4 days	" " inanition.
"	W. 58	1 mo.	. . . .	" " congestion of the lungs.
Bennett	M. 52	Well	. . . .
Brown	W. 56	4 mos.	. . . .	" " progress of disease.
Butz	M. 35	1½ mos.	. . . .	" " hæmorrhagia of the tumor.
"	M. 49	. . . .	3 days	
Clarke	M. 48	Well	. . . .	Reported well ten months later.
"	W. 36	1 mo.	. . . .	Supposed occlusion of the orifice.
Fenger	?	Success	. . . .	No other details.
Hawkins	M. 45	7 mos.	. . . .	Death. Post-mortem shows orifice completely closed.
Heigl	?	Success	. . . .
Hester	M. 36	. . . .	25 hours	Operated <i>in extremis</i> .
Hoegh	M. 43	Well	. . . .
Hume	M. 53	2 mos.	. . . .	Died from progress of disease.
Hunter	?	Success	. . . .
Jessett	M. 61	. . . .	4 days	Cachexia. Anastomosis in perfect condition.
"	W. 56	Well	. . . .	In good health four years after operation.
"	W. 45	9 mos.	. . . .	Died from progress of disease.
"	M. 67	. . . .	10 days	Peritonitis, external infection, anastomosis perfect.
"	M. 52	Well	. . . .
"	W. 42	"	. . . .
"	W. 53	. . . .	Died	No details.
"	M. 51	Well	. . . .
Larkin	W. 47	5 mos.	. . . .	See discussion of this case.
McFarlane	M. 36	7 mos.	. . . .	" "
Mansell-				
Moullin	M. 20	1½ mos.	. . . .	Died; cachexia. Anastomosis perfect.

GASTRO-ENTEROSTOMY.—Concluded.

Surgeon.	Sex. Age.	Survival.	Time from Operation to Death.	Remarks.
Mansell-				
Moullin	W. 35	. . . .	6 days	Temperature subnormal until death.
Morison	M. 31	8 days	. . . .	Syncope. Post-mortem reveals good condition.
Paul	W. 48	1 mo.	. . . .
Purcell	W. 44	Well	. . . .	Left the hospital at the end of a month.
Ramsay	W. 47	"	. . . .	Left the hospital at the end of a month.
"	M. 44	"	. . . .
Ransohoff	M. 37	"	. . . .
Renton	W. 38	"	. . . .	Reported in good health eight months later.
"	M. 47	"	. . . .
Robson	M. ?	. . . .	3 days	Cachexia too advanced to permit recovery.
"	W. 27	3 mos.	. . . .	Died from progress of the disease.
"	M. ?	3 weeks	. . . .	Anastomosis in perfect condition.
Russell		Success	. . . .
Ruth	M. 58	. . . .	12 hours	Operated <i>in extremis</i> .
Senn	M. 65	. . . .	5 days	Marasmus. Anastomosis perfect.
"	M. 47	3½ mos.	. . . .	Progress of disease.
"	M. 35	3 weeks	. . . .	Low anastomosis, stoppage causing death.
"	M. 43	4 mos.	. . . .
"	M. 38	. . . .	5 days	Dry plates, perforation, peritonitis, death.
"	M. 69	. . . .	2 hours	Operated <i>in extremis</i> .
"	M. 32	14 days	. . . .	Hæmorrhagia of the tumor.
"	W. 45	12 "	. . . .	Acute pneumonia (epidemic of "La Grippe").
"	M. 71	20 mos.	. . . .	Progress of disease.
"	M. 37	. . . .	5 hours	Shock.
"	M. 45	18 days	. . . .	Cachexia too advanced.
"	M. 35	3 mos.	. . . .
"	M. 44	. . . .	8 hours	Operated <i>in extremis</i> .
Stamm	W. 63	5 weeks	. . . .	Rapid progress of disease.
Stansfield	M. 53	4 mos.	. . . .	Orifice of anastomosis closed.
Taylor	M. 56	Well	. . . .	Left the hospital after six weeks.
Von Baračz	M. 60	"	. . . .

PYLORECTOMY.

Surgeon.	Sex. Age.	Survival.	Time from Operation to Death.	Remarks.
Jessett	W. 38	Well	. . .	Reported well four years later.
Morison	M. 65	. . .	4 days	Cardiac syncope.
Rawdon	M. 56	Well	. . . .

CHOLECYSTENTEROSTOMY.

Surgeon.	Sex. Age.	Survival.	Time from Operation to Death.	Remarks.
Chavasse	M. 47	Well	. . . .	To cure biliary fistula.
Robson	W. 65	"	. . . .	To cure biliary fistula

ILEO-ILEOSTOMY.

Surgeon.	Sex. Age.	Survival.	Time from Operation to Death.	Remarks.
Battle	M. 24	. . . .	3 days	Insufficient resection of gangrenal hernia.
Graff	W. 58	Well	
"	W. 40	"	. . . .	Faulty invagination to close the end of gut.
"	W. 50	. . . .	4 days	
Homans	W. 10	Well	. . . .	Insufficient excision of gangrenal intestine.
Lane	W. 53	"	
"	W. 55	. . . .	5 days	
Russell	M. 15	Well	. . . .
Wright	M. 56	"	

ILEOCOLOSTOMY.

Surgeon.	Sex. Age.	Survival.	Time from Operation to Death.	Remarks.
Atkinson	M. 22	Well	Extensive ligation, gangrene of intestine.
Barling	?	. . . .	6 days
Elliot	M. 60	Well	Died of bronchitis, otherwise in good health.
Ilott	W. 50	"	
Lawson	M. 40	"	
Littlewood	M. 35	"	
Morison	M. 57	2 1/2 mos.	
Robson	M. 56	Well	Insufficient excision of invaginated intestine.
Senn	M. 37	"	
"	W. 53	. . . .	6 days

COLOCOLOSTOMY.

Surgeon.	Sex. Age.	Survival	Time from Operation to Death.	Remarks.
Abbe	M. 60	Well	. . . .
Allingham	M. 30	"	. . . .

BIBLIOGRAPHICAL INDEX—CLINICAL REPORTS.

- Abbe*: N. Y. Med. Journal, 1889, Vol. XLIX, p. 314.
Allingham: Trans. Clinical Society, 1892-93, Vol. XXVI, p. 158.
Allingham: British Med. Journal, 1893, Vol. I, p. 847.
Allingham: British Med. Journal, 1894, Vol. I, p. 968.
Atkinson: British Med. Journal, 1890, Vol. II, p. 962.
Atkinson: Lancet, 1892, Vol. I, p. 1024.
Barker: British Med. Journal, 1892, Vol. I, p. 61.
Barling: British Med. Journal, 1892, Vol. I, p. 915.
Battle: British Med. Journal, 1893, Vol. II, p. 994.
Battle: Lancet, 1893, Vol. II, p. 1129.
Battle: British Med. Journal, 1894, Vol. I, p. 967.
Beatson: Lancet, 1890, Vol. II, p. 761.
Bennett: See Ewart.
Brown: Trans. Clinical Society, 1891, Vol. XXIV, p. 178.
Brown: British Med. Journal, 1891, Vol. I, p. 966.
Bruce: Canadian Practitioner, 1893, p. 86.
Butz: St. Petersburg Med. Woch., 1893, p. 181.
Carter: See Rawdon.
Carter: Lancet, 1890, Vol. I, p. 800.
Carter: Liverpool Medico-Chir. Journal, 1890, Vol. X, p. 494.
Chavasse: Lancet, 1892, Vol. I, p. 568.
Clarke: British Med. Journal, 1889, Vol. II, p. 1089.
Clarke: British Med. Journal, 1891, Vol. I, p. 788.
Clarke: Lancet, 1890, Vol. II, p. 1213.
Currier: Cited by Dawbarn, ANNALS OF SURGERY, 1893, p. 147, offers no clinical case as this operation was merely a step in the extirpation of ovarian tumor.
Elliot: Bost. Med. and Surg. Journal, 1894, Vol. CXXX, p. 285.
Ewart: Trans. Clinical Society, 1891, Vol. XXIV, p. 247.
Ewart: See Bennett, British Med. Journal, 1891, Vol. I, p. 966.
Fenger: Cited by Abbe in Med. News, 1889, Vol. LIV, p. 589.
Graff: Northwestern Lancet, 1893, Vol. XIII, p. 181.
Hawkins: Australasian Med. Gaz., 1891-92, p. 271.
Heigl: Cited by Dawbarn, and others.
Hester: Australasian Med. Gaz., 1889-90, pp. 33 and 303.
Hoegh: ANNALS OF SURGERY, 1894, p. 658.

- Homans*: Bost. Med. and Surg. Journal, 1891, Vol. cxxv, p. 488.
Hume: British Med. Journal, 1893, Vol. 1, p. 842.
Hunter: Cited by Abbe.
Hott: Lancet, 1894, Vol. 1, p. 538.
Jessett: British Med. Journal, 1892, Vol. 1, p. 119.
Jessett: Lancet, 1890, Vol. II, p. 68.
Jessett: Lancet, 1891, Vol. II, p. 921.
Jessett: Medical Press and Circular, 1892, Vol. LIV, p. 234.
Jessett: Trans. Clinical Society, 1891-92, p. 105.
Lane: Trans. Clinical Society, 1891, Vol. xxiv, p. 182.
Lane: Lancet, 1891, Vol. 1, p. 1101.
Lane: British Med. Journal, 1891, Vol. 1, p. 1071.
Larkin: Lancet, 1891, Vol. II, pp. 72, 667, 1222.
Lawson: Lancet, 1893, Vol. 1, p. 649.
Littlewood: Lancet, 1892, Vol. 1, p. 864.
McFarlane: See Bruce.
Mansell-Moullin: Lancet, 1893, Vol. II, p. 428.
Morison: British Med. Journal, 1893, Vol. 1, p. 841.
Morison: British Med. Journal, 1893, Vol. II, p. 1148.
Morison: Medical Press and Circular, 1892, Vol. LIV, p. 107.
Paul: Liverpool Medico-Chir. Journal, 1892, Vol. XII, p. 256.
Purcell: Lancet, 1892, Vol. 1, p. 1238.
Ramsay: Northwestern Lancet, 1891, Vol. XI, p. 152.
Ransohoff: Medical Chronicle, 1889, p. 226.
Ransohoff: Polyclinic, 1889, for February.
Rawdon: See Carter.
Rawdon: British Med. Journal, 1890, Vol. 1, p. 323.
Renton: British Med. Journal, 1892, Vol. 1, p. 64.
Renton: Glasgow Med. Journal, 1892, Vol. xxxviii, p. 424.
Robson: Lancet, 1891, Vol. 1, p. 1140.
Robson: British Med. Journal, 1894, Vol. 1, p. 903.
Robson: British Med. Journal, 1893, Vol. 1, p. 688.
Robson: Medico-Chirurgical Trans., Vol. LXXV, p. 407.
Russell: N. Y. Med. Journal, 1890, Vol. LII, p. 673.
Ruth: Medical News, 1892, Vol. LXI, p. 379.
Senn: N. Y. Med. Record, 1891, pp. 557 and 589.
Senn: Trans. N. Y. Med. Asso., 1891, Vol. VIII, p. 191.
Senn: Journ. of Am. Med. Asso., 1890, Vol. XIV, p. 845.
Stamm: Medical News, 1890, Vol. LVI, p. 112.
Stansfield: British Med. Journal, 1890, Vol. 1, pp. 294, 1300.
Taylor: (See Brookhouse), Lancet, 1891, Vol. 1, p. 718.
Von Baratz: Centralblatt f. Chir., 1892, p. 575.
Wright: British Med. Journal, 1892, Vol. 1, p. 909.

OTHER REFERENCES.

Baillet: "La résection du segment ileo-cœcal," Thèse de Paris, 1894.

Billroth: Wien. klin. Woch., 1891, p. 627.

Hartmann and Bourbon: "Bromure d'éthyle et chloroforme," Revue de Chirurgie, 1893.

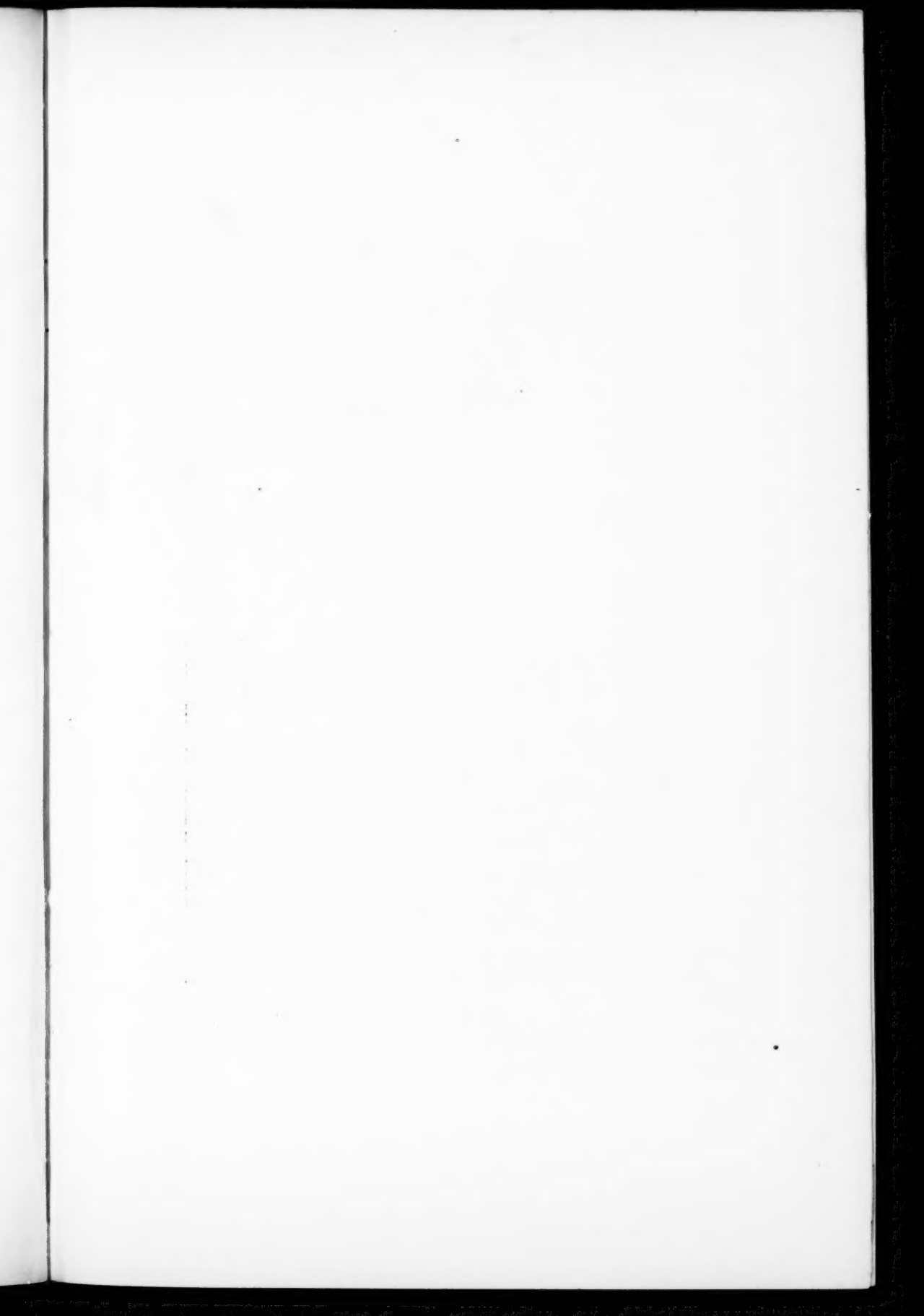
Magill: "A New and Rapid Method of Anæsthesia," N. Y. Med. Record, October 21, 1893.

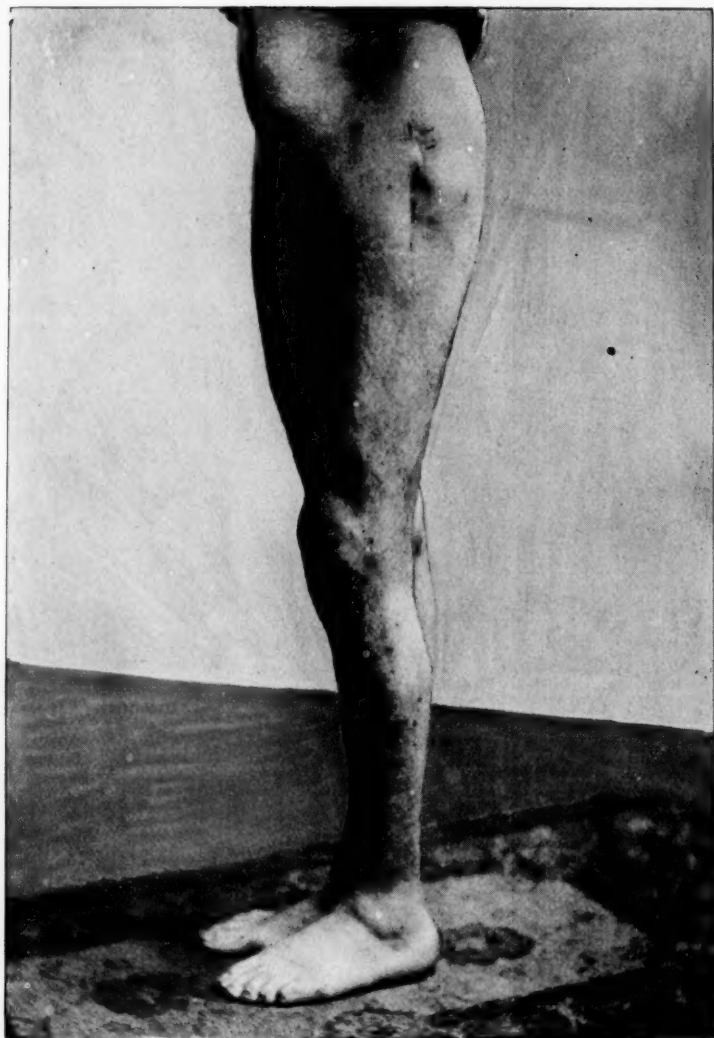
Magill: "Approximation viscérale par plaques absorbables," Thèse de Paris, 1894.

Malherbe: Bulletin Médical, 1894, pp. 205, 219.

Murphy: N. Y. Med. Record, 1894, Vol. 1, p. 656.

Von Hacker: Jahrbuch des K. K. Gesell., Wien., 1890.





W. S.—Four months after operation for old unreduced dislocation of hip.

THE OPERATIVE TREATMENT OF OLD UNREDUCED
AND IRREDUCIBLE DISLOCATIONS
OF THE HIP.

By M. L. HARRIS, M.D.,

OF CHICAGO,

PROFESSOR OF SURGERY IN THE CHICAGO POLYCLINIC.

THE following recent case was sent to me by Dr. Campbell, of Livingston, Montana :

W. S., ranchman, aged thirty-three. On October 16, 1893, while threshing, he was struck on the left hip by an iron pulley, weighing about 350 pounds.

The injury was so severe that he was unable to use his leg, but he supposed it was only a severe sprain, and that it would recover. After walking around on crutches for about a month with no improvement he called a physician, who diagnosed a dorsal dislocation of the left hip. He was anæsthetized and reduction attempted, but without success. Four days after this a second attempt at reduction was made which was likewise unsuccessful. He then remained in bed two days when he was up and around on crutches again. Two weeks later a third attempt to effect a reduction was made, but with no better result than the previous efforts. He was unable to use the leg at all, and could only get around with the aid of crutches. Despairing of being able to effect reduction without operative measures he was sent to me at the Polyclinic, February 9, 1894. His leg presented the usual characteristics of a dorsal dislocation,—slight flexion, adduction, internal rotation, shortening, and the top of the trochanter major extending above Nélaton's line. The whole limb was somewhat atrophied, and both active and passive motion were very much limited and painful.

In view of the repeated and prolonged unsuccessful efforts at reduction it was concluded not to resort to forcible methods again, but to cut down upon the joint at once.

Consequently, on February 11, 1894, nearly four months after the injury, the following operation was performed :

An incision about fourteen centimetres in length was made in front of the great trochanter between the tensor vaginæ femoris and the gluteus medius, thus leading directly down to the acetabulum and anterior surface of the head and neck of the femur. As was expected, the acetabulum was found filled with a tough, adherent connective-tissue proliferation from the anterior portion of the capsular ligament, which in falling over the cavity completely closed it. On cutting through the capsular ligament the head of the bone was found resting on the posterior and superior edge of the acetabulum in a shallow depression, the lining of which had a smooth cartilaginous feel. Immediately in front of the head and helping to fill the cotyloid cavity was a piece of bone, curved in shape, about three centimetres in length by one centimetre in depth and 0.5 centimetre in width, which had been detached from the posterior wall of the acetabulum. This may have been an obstacle to the early reduction of the case. The head of the bone was still covered with smooth cartilage, while the neck had acquired new firm adhesion to all the surrounding parts, thus producing a new capsular ligament. A restoration of the ligamentum teres could not be demonstrated, but a small portion of it was present in the depression in the head when the head was turned out of its new joint.

The adhesions to the neck were divided, and all the muscular attachments to the great trochanter and shaft as far down as the lesser trochanter were separated subperiosteally from the bone, thus liberating the entire upper end of the femur. Attention was then directed to the acetabulum, which, by means of the gouge and sharp spoon, was freed of capsular ligament and new connective-tissue formation.

The cartilage lining the bottom of the cavity was found to be still smooth. The head of the bone, however, could not be made to enter the acetabulum, which seemed too small. The cavity was consequently enlarged somewhat posteriorly with the gouge and mallet, after which, by considerable exertion and manipulation, the head was finally returned to its place, and the leg assumed its normal position.

The wound was partly stitched up, and the balance packed with iodoform gauze. The limb was placed in the extended position, slightly abducted and externally rotated, a plaster cast put on and extension applied.

The operation was a very severe one, occupying fully two hours. The patient suffered considerable shock, although the loss of blood was not great. Reaction came on promptly, and the progress of the case was favorable from the start. There was considerable serous drainage from the wound during the first few days necessitating rather frequent renewals of the dressings.

In three weeks the wound was closed, but in another week, on March 6, there was a rise in temperature, with pain over the great trochanter. Upon opening one corner of the wound a small quantity of sero-pus was evacuated from a small cavity superficially situated over the trochanter, and not communicating with the joint. A counter-opening posteriorly drained this, and it gave no further trouble.

The extension was continued three weeks. After its removal the leg swelled considerably throughout its entire length. This was relieved by tight bandaging, so that in about two weeks more, or six weeks from the time of the operation, he was allowed up on crutches. In three months he could walk with a cane without pain in the hip. There was active motion in all directions,—flexion, abduction, adduction, and rotation, which, though limited, was daily increasing.

The marked deformity, permanent disability, and often great suffering, resulting from old unreduced dislocations of the hip have led surgeons of all times to resort to extreme measures to effect a reduction. The older methods, of the application of great force after manipulation failed, were often followed by serious results, and frequently failed altogether.

On the advent of antiseptic surgery it was hoped these cases might be remedied by operative measures. How this hope has been realized a short review of the literature on the subject will determine. The first one to resort to operative measures to effect a reduction of an old unreduced dislocation of the hip was Delagarde,¹ in 1861.

CASE I.—Robert H., laborer, aged fifty-one years. Five months before the operation had the left lower extremity crushed and lacerated by the falling of a cob wall.

¹ St. Bartholomew's Hospital Reports, 1866, Vol. II, p. 183.

The thigh bone was broken in two places and its head dislocated into the sacro-sciatic notch. On August 1, 1861, four months after the accident, he was brought to the hospital. The fracture was well united, but no attempt had been made to reduce the dislocation. The man's state was deplorable. The slightest attempt to move the thigh made the head of the femur press on the sciatic nerve, producing throughout the limb a most peculiar numbness which was intolerable.

He lay as straight as if a spit had been thrust from his heel to his head. His health was rapidly sinking. The head of the femur was lodged deeply in the upper part of the notch, and the neck lay buried in the soft parts. September 1, 1861, Delagarde made a deep incision from the trochanter to the sacrum through the gluteus, and laid bare the neck and head of the femur. Upon this an adventitious capsule had been formed. The ligamentum teres was strained but not broken. The piriformis tendon passed under the neck with the obturator tendons. The limb was rolled inward and an elevator carefully pressed under the neck of the femur so as to lift the head off from the sciatic nerve.

The semilunar limb of a very strong bone-cutter was passed under the neck near the trochanter, but the bone was so hard that not the slightest impression could be made. It was withdrawn and a trephine tried. The pivot could hardly be made to pierce the bone, but at length with great labor a circular disk was taken out. The cancellated structure was gouged out until the opposite wall was reached, then a smaller trephine was introduced and worked nearly through the bone. Then a strong narrow-bladed saw was passed into the cavity, and the bone remaining between the two circles was divided by it. A very strong pair of bone forceps was fixed first in one groove and then in the other until the head of the bone was thus cut off. The splintered portions were nipped or filed down. The sciatic nerve was laid bare for an inch and a half. It was curiously flattened and moulded to the head of the femur. The operation took three-quarters of an hour. Relief was immediate. The wound healed in six weeks. He could sit up in bed with the thigh at a right angle with the body. Gentle exercises on the parallel bars soon gave great freedom of motion. He was discharged on January 16, 1862, with a serviceable limb and in good health.

He died in the summer of 1864, of pneumonia, having slept in the rain one Saturday night instead of going home as a sober man would.

CASE II (Hamilton¹).—Male, twenty-eight years old, was thrown while wrestling. A surgeon, who was called in the next day, finding a dorsal dislocation, placed him under an anæsthetic, and, as he supposed, reduced the dislocation by manipulation.

It was not reduced, however, and, although this fact was recognized, no further attempts at reduction were made until the case was sent to Dr. Hamilton.

January 29, 1869, some seven months after the accident, Dr. Hamilton attempted to break up the adhesions and reduce the dislocation, the patient being under the influence of ether, but after a trial of nearly an hour the attempt was abandoned.

February 24, he was again placed under the influence of ether and another attempt made to reduce it, but without success. Believing now that the untorn portion of the capsule and particularly the ilio-femoral ligament constituted the chief obstacle to reduction, a long, firm but narrow bistoury was introduced just above the trochanter major, carrying its point inward until it touched the neck at the base of the trochanter. From this point, the edge of the knife being directed towards the head of the bone, the point of the knife was swept slowly along until the head was distinctly felt.

This was accomplished without enlarging the external opening. While the incision was being made, the limb was kept rotated outward and abducted as much as was possible, and it was felt to yield distinctly, so that both rotation outward and abduction were more complete afterwards than before. The tensor vaginæ femoris was then divided and attempts at reduction were repeated both by manipulation and extension, but without success. The subsequent history of the patient is not given.

CASE III (Volkmann,² May, 1876).—W. H., laborer, fifty-one years old. On February 5, 1876, while working in a clay ditch, he was almost buried under a large mass of earth from the caving in of the bank. After being liberated he was unable to work and was taken home. He remained in bed four weeks, when he undertook to go around on crutches. He had no medical treatment. After two months, no improvement taking place, he came to Volkmann's clinic. He was unable to walk a step without crutches. An examination showed that rare form of dislocation of the hip described as *luxatio perinealis*.

¹ Hamilton, Fractures and Dislocations, 1880 ed., p. 799.

² Berliner klinische Wochens., 1877, p. 357, by H. R. Ranke.

On April 2 attempts at reduction were made under deep narcosis. The attempts were not successful in so far as reducing the head was concerned, but succeeded in converting it into an ordinary dorsal dislocation. Repeated attempts to bring the head from this position into the acetabulum only succeeded in placing it back in the old position in the perineum and again on the dorsum ilii.

Six or eight times was the head passed from one position to the other, and, as reduction was impossible, it was finally left in the dorsal position, as it was thought to be more accessible to operative procedure in this position than in the perineum.

An extension dressing was applied, and kept up with considerable weight for six weeks, in the hope of getting a better position and a more useful limb. However, this hope failed completely.

May 15, 1876, or about three and a half months after the accident, the soft parts were divided by a long, straight incision over the great trochanter as for an ordinary resection. As the head lay flat upon the dorsum ilii it was not sufficiently exposed by the longitudinal incision, so a transverse cut of about eight centimetres through the gluteus maximus, but not involving the skin, was added to it.

Although the head and neck could now be easily seen, the hindrances to reduction could not be discovered. The muscles attached to the great trochanter were now separated in the usual manner, but this also led to no results. The head still remained immovable and, in spite of repeated attempts, could not be reduced. The capsule as such was not recognizable, but the whole surrounding of the joint was indurated.

At last the head was freed so that upon strongly adducting the thigh it was brought out of the wound. Now for the first time could be seen a thick muscular layer stretched over the acetabulum. Its upper layers were indurated and fibrous and everywhere grown to the edge of the cavity. It was at least one centimetre thick. Every attempt, therefore, to bring the head into the acetabulum had to be given up and the head immediately resected.

It was consequently drawn out of the wound and removed with the usual amputating saw below the trochanter and the end rounded off with a bone forceps. A light pull on the foot now succeeded in bringing the leg into its normal position. The usual extension dressing for a resection was applied and the healing was without special incident.

July 5, with a Wolf-Taylor's apparatus, the first attempt at

walking was made, and in eleven days more he was allowed to go home.

Result Nine Months after the Operation.—The right foot is scarcely smaller than the well one. When the pelvis is straight there is a shortening of four centimetres. Passive motion without narcosis is not very extensive, active motion about the same. He walks without a high shoe, with the aid of a cane, and has a moderate limp. Extension is still continued at night.

CASE IV (MacCormac,¹ 1878).—A sailor, some twenty months previous, received a thyroid dislocation of the hip. All other means of reduction having failed, MacCormac tried subcutaneous tenotomy of the obstructing muscles, but without any benefit, as reduction was still impossible. He then made a resection of the head of the bone through a large Y shaped incision over the trochanter. The result of the operation is simply stated as being good.

CASE V (Sidney Jones,² 1879).—A. R., eleven years of age, in May, 1879, met with an accident producing a dorsal dislocation of the right hip. The dislocation was recognized, and is said to have been reduced and splints applied, but when these were removed the head of the femur was still found on the dorsum ilii. Several attempts at reduction were made, but without success.

The patient came under Mr. Jones's care in October, 1879. Three attempts by manipulation and pulleys were made, but to no purpose. The limb was useless for progression on account of the shortening and inversion. November 25, 1879, seven months after the accident, the head of the bone was excised, the malposition of the limb corrected, and the upper end of the shaft drawn down to the acetabulum, which was filled up with condensed tissue and inflammatory material.

Five years after the operation the boy had a straight limb, one inch shorter than the opposite one. He can run, jump, play cricket, and ride a tricycle.

CASE VI (Koch³).—J. S., forty-one years old, strong farmer, was injured in the early part of 1880 by a falling tree, causing a dislocation of the right hip.

Attempts at reduction were made some days later, but without

¹ St. Thomas's Hospital Reports, 1878, Vol. IX, p. 101.

² London Lancet, November 15, 1884.

³ Berliner klin. Wochen., 1882, p. 492.

success. October 1, 1881, twenty months after the accident, he came to the Dorpat clinic.

The head of the thigh bone had the characteristic position of a sciatic dislocation, and was probably separated from the shaft by a fracture of the anatomical neck.

However, the fractured surfaces must have been held in close contact by short fibrous tissue as the crepitus between the ends of the bone, which were demonstrably movable, was only very slight. The tip of the trochanter was one and one-half inches above Nélaton's line. With the pelvis straight the leg was flexed 90° , strongly rotated inward and abducted 45° .

Attempts to move the head back into the acetabulum were without effect.

October 3, 1881, osteotomy just above the lower trochanter was performed, a wedge of bone being taken out posteriorly. October 17, wound healed.

In deep chloroform narcosis the shaft was fractured from the trochanter by torsion. The extremity was then placed in extension, abduction, and external rotation, and fixed in plaster with the other thigh and pelvis. November 7, the fracture was consolidated, but the patient could not walk on account of swelling of the limb. By the end of December recovery was complete.

When lying in a horizontal position the leg was abducted about 40° . Flexion and external rotation were such as to bring the foot in the same position as the left leg. The ankle is ankylosed at 145° , and there are seventy-five centimetres shortening. The abduction of 40° was attributed to the fact that the patient would not lie straight in bed. This position could be corrected by another osteotomy or fracture of the femur.

By marked flexion and bending of the pelvis he could just bring the ends of the metatarsal bones to bear on the ground and walk. Walking, however, was difficult.

CASE VII (Wahl,¹ February 16, 1882).—A case of dorsal dislocation of the left hip, which was irreducible at the end of only twenty-five days.

February 16, 1882, Wahl chiselled the bone below the great trochanter, broke the shaft, and placed the limb in a straight position at the same sitting. He secured such a perfect union of the wound

¹ Berliner klin. Wochen., 1882, p. 492.

that on the 10th of March, with a plaster cast on, the first attempts at walking were made, and on the 18th of March he was discharged with a straight and useful limb. There were a few centimetres of shortening.

CASE VIII (William Adams,¹ March 29, 1882).—A boy, eleven years old, during an attack of rheumatic fever, suffered a dislocation of the head of the femur on the dorsum ilii.

The patient was admitted to the Great Northern Hospital, under Mr. Adam's care, March 4, 1882.

All attempts at reduction were unsuccessful even after a subcutaneous division of the adductor longus tendon. Mr. Adams then excised the head of the femur by making a T-shaped incision with the long arm two and a half inches in length directly over the head and neck, and the short arm one inch in length transversely over the head, which was at once exposed. The head of the femur was uncovered by capsular ligament and the articular cartilage was in a healthy condition.

It was found that the capsular ligament had been ruptured and the torn margins of the rent passed on either side closely embracing the neck of the bone.

After dividing the margins of the capsular ligament the operator passed his small subcutaneous saw to the neck of the bone and cut through it a little below the margin of the articular cartilage. The detached head was then drawn out of its position after some slight adhesions were cut through.

The round ligament preserved its normal connection with the head of the bone and was adherent to the articular cartilage, having been divided with the saw a little below the head.

The wound progressed favorably without much suppuration, and on June 1 was completely healed. June 14 the patient was allowed to walk with crutches, and on October 1, without them.

The limb was perfectly straight and motion at the hip-joint free in all directions.

CASE IX (Polaillon,² 1883).—This was a case of obturator dislocation, of one and a half months standing, in a man forty-six years of age.

The dislocation being forward, the incision was made anteriorly.

¹ London Lancet, November 1, 1884.

² Bull. et Mém. de la Soc. de Chir., January 31, 1883, p. 110.

No regard for the muscles was shown, but all tight bands which offered resistance were divided, which included all muscles attached to the great trochanter. The head and neck of the bone were completely isolated from the soft parts. Reduction of the head was finally accomplished, and in this respect the case was successful, but the patient died very soon after from foudroyant gangrene. This is the first case wherein reduction by the open method was effected. At the autopsy the great trochanter was found nearly detached from the femur.

CASE X (Marguary, 1884¹).—This was a case of dorsal dislocation irreducible after eight months. An attempt was made to reduce by the open method, but had to be abandoned, and resection of the head of the bone was performed. The result is stated as having been good. Further details of this case were not accessible to me.

CASE XI (Nicoladoni, 1886²).—This was a case of dorsal dislocation of seventy-six days standing. The usual incision for resection was made, and after an unsuccessful attempt to reduce resection was completed, the bone being divided below the great trochanter. The case suppurated and the result is not stated.

CASE XII (Severano, October, 1886³).—A peasant woman, while working in a ditch, was suddenly buried by the caving in of the bank. She was taken out immediately but was unable to rise, and suffered pain in the right hip. Three days afterwards she was admitted to the service of Severano, and presented all the signs of an ischio-iliac dislocation. After unsuccessful attempts at reduction under chloroform by manipulation a traction apparatus was applied, but in spite of traction, to the extent of 400 kilogrammes, it was impossible to displace the head of the femur more than a few centimetres. At the same time traction was being made pressure was exercised upon the head from above downward and behind forward. After three-quarters of an hour of unsuccessful efforts Severano made an incision, ten centimetres in length, over the head of the bone and parallel to the fibres of the glutæus maximus. On introducing his finger into the wound to explore the surroundings of the neck, in order to discover the cause of the irreducibility, he found that the capsule was torn at its inferior part, and that the limb when rotated inward, thus displacing the head upward and backward, had so twisted the capsule upon its axis that the head could not be returned through the opening made on leaving the

¹ Archivio di Ortopedio, January, 1884.

² Wien. med. Wochensch., 1885, No. 23, p. 729.

³ Cong. Franç. de Chir., 1886, 2d Sec.

cavity. With the aid of a blunt-pointed bistoury a large incision in the capsule was made.

Traction was again applied and carried to the extent of 400 kilogrammes. A less resistance was found, nevertheless, it was impossible to obtain an elongation of more than about two centimetres in order to make the head regain its cavity. In the face of these repeated unsuccessful attempts at reduction resection of the head of the femur was practised, after which the neck entered the cotyloid cavity and the limb assumed its normal position. The wound was then cleaned, drained, and sutured, an aseptic dressing applied, and the limb fixed in plaster of Paris. After thirty days' treatment the wound healed without accident.

The patient then left the hospital clandestinely, and nothing is known of his after history.

CASES XIII and XIV (Vecelli,¹ 1887).—The first of these cases was a dorsal dislocation in which a free anterior incision with division of tendons was made, and the second an anterior dislocation. Reduction is said to have been accomplished in both cases; but details are lacking, and the ultimate result is not known.

CASE XV (Quénu,² September 28, 1887).—B. B., aged twenty-six years, stone-cutter by trade, was thrown down July 10, 1887, by an enormous block that he was trying to displace. He was immediately carried to the hospital, and the next day the surgeon found the usual signs of a dorsal dislocation of the right hip. Chloroform was given and an unsuccessful attempt made at reduction. Some days after the patient was again put to sleep, and for an hour attempts were made to bring the head of the femur into the acetabulum by the use of force and traction apparatus, but all efforts were ineffectual. The days following these efforts the patient had fever and complained of pain in the whole limb, while the region affected presented some swelling. On August 12, one month after the injury, he was still obliged to remain almost continually in bed. He had tried to walk on crutches, but had to give them up on account of pain. He could only sit on the left side, and even when in bed often complained of pain along the sciatic nerve, which was increased immensely upon the slightest movement. The attitude of the limb was one of adduction, flexion, and internal rotation. Shortening six centimetres.

¹ Fiorani, *Comptes-Rendu dans l'Archivio di Ortopedio*, 1887, Anno IV, p. 411. (See Bloch.)

² *Rev. de Chir.*, 1887, No. 7, p. 1003.

August 17 another attempt under chloroform was made at reduction, but in spite of a probable tearing of the ligaments, as indicated by crackling sounds, the head could not be moved from its place. Considerable pain followed this attempt. He was put to bed, and during the next month some amelioration in the functional state of the limb was hoped for, but no progress was made, so an operation was proposed to the patient and accepted. The hope was still entertained that after opening the joint the cause of the irreducibility could be discovered and removed, and the head replaced in the acetabulum.

September 28 an incision about fifteen centimetres long was made posterior to the great trochanter over the head of the femur. After section of the glutæus maximus, which was very thick, a veritable capsule masking the head was encountered. It was necessary, in order to uncover this, to cut through a thick vascular layer extending from the coxal bone to the neck of the femur.

After several incisions, made difficult on account of hæmorrhage at the bottom of a deep wound, it was found that not only new ligamentous tissue completely covered the bone, but that all around the head this new capsule contained irregular plaques of cartilaginous consistence, simulating a new articular cavity. The sciatic nerve, which was raised and pushed upward and backward, was drawn aside, and search was made with the finger to discover the breach in the capsule produced at the time of the dislocation, but in front as well as behind the capsule was complete and very thick. There was no sign whatever of an acetabulum. After section of a part of the anterior capsule, an attempt at reduction was made in the hope of mobilizing the head and the better to find the acetabulum, but the head remained immovable, and pressed strongly against the ilium. Thinking that the wound by this time, from so much manipulation, had become contaminated so as to interfere with union, and lead to the formation of an abscess, it was decided to remove the head of the bone, which was done with a chisel and mallet. It then alone became possible to correct the vicious position of the limb, and to place it in extension and external rotation. The wound was closed with drainage, but suppuration occurring it was reopened and packed with iodoform gauze. An abscess formed in front of the trochanter about the head of the bone, which was opened and drained. Recovery was slow. Extension was kept up for more than four weeks.

November 15, forty-eight days after the operation, the patient

was permitted to get up on crutches. The limb was straight and in excellent position, with four centimetres shortening.

By the end of February, five months after the operation, he could walk with the aid of a cane. There was some motion in the hip, and he could flex the knee to a right angle. He had no more pain such as he had before the operation. He was advised to wear a shoe with a thick sole.

CASE XVI (Oscar Bloch,¹ December 23, 1887).—N. L., aged seventeen years, apprenticed carpenter, arrived at the Frederick Hospital, December 6, 1887. One hundred and three days previously he met with an accident during a *fête*. After the accident he was transported to the Province Hospital, situated in the neighborhood. There a physician diagnosed a dorsal dislocation of the hip, and attempted its reduction under anæsthesia. The patient awoke during the manipulation and heard a noise, which was also perceived by his father, and which was supposed to have been caused by the head slipping back into place. At the end of seventeen days he left the bed, and, upon the consent of the physician, left the hospital, his left extremity being in a bad state as to mobility.

Four or five weeks later the physician found the patient had pain on walking due to the dislocation, which had never been reduced. He was then sent to the Frederick Hospital, under Dr. Bloch's care. On December 9, an ineffectual attempt at reduction was made under anæsthesia, which was repeated on the 15th, with the same result.

December 23, 120 days after the accident, the following operation was undertaken: An anterior exploratory incision was made between the sartorius and rectus muscles. On alternately flexing and extending the femur the capsular ligament was recognized with difficulty by touch. However, by the aid of retractors, he succeeded in uncovering the anterior face of the capsule for a distance of about five centimetres, which he freed to an extent of three centimetres. On introducing the finger the tight bands could be felt but not seen. He cut particularly upward, outward, and backward, then tried twice to reduce the head by flexion followed by rotation inward, adduction and traction upward, then rotation outward, but without success. He could then feel clearly that the acetabulum was filled with solid matter. The wound was irrigated with carbolized water, cauterized with

¹ Rev. d'Orthop., May 1, 1890.

10 per cent. zinc chloride, irrigated again and sutured with catgut, leaving a place for drainage. Langenbeck's incision for resection was then made. The head was found enveloped in a soft ligamentous capsule. It was raised up with two of Langenbeck's sharp hooks and detached with difficulty. The acetabulum was completely filled with fibrous masses, of which a small cuneiform portion was taken out to form a slight depression and a fresh surface. The limb was placed in a normal position, and dressed with extension, which was continued for eight weeks. Both wounds healed *per primam*, and in fifty-seven days after the operation he left the hospital. Eleven months after he was in good health, and able to work at his trade of carpentering. The reare three to four centimetres shortening, he has some motion at the hip-joint, and can walk without a cane, although he needs one for long distances.

CASE XVII (C. T. Parkes,¹ May 12, 1888).—G. S., twenty-one years old, applied for treatment of an old upward and backward dislocation of the hip of one year's standing, caused by a bank of coal falling on him while in a stooping position. The patient limped severely and suffered great pain on walking. The diagnosis made was readily confirmed. The patient being somewhat emaciated, the head of the bone could easily be felt on the dorsum ilii, and the limb had the characteristic position accompanying this form of dislocation. He was anæsthetized and reduction attempted by means of manipulation. All methods having been tried and found useless he was permitted to rest for a week, when a second attempt was made. This time extension and counter-extension by means of the compound pulley was made use of, together with manipulation, but again with a negative result. Several fruitless attempts had been made shortly after the injury by different surgeons. An incision eight inches long was now made directly over the head and great trochanter as low down as the lesser trochanter and through the new connective tissue down to the ilium. The muscles were separated from the great trochanter so that all restricting tissues were divided. The wound was held open by means of sharp hooks laying bare the acetabulum, which was found empty and in a normal condition, except a slender patch of the upper margin which had been broken off. Only the lower part of the capsule could be distinguished, and this was attached to the neck of the femur and the brim of the acetabulum. Placing

¹ N. A. Practitioner, November, 1890, p. 499.

the handle of an open forceps in the acetabulum the head was readily pried into place, and retained there by means of extension, which was continued eight weeks. The wound was closed by deep silk sutures and a rubber drainage-tube inserted. Healing by first intention occurred except along the track of the tube. At the end of eleven weeks the patient was discharged from the hospital, able to walk with a cane and a crutch without pain. The position was very good, and the range of motion limited, but constantly increasing. His after history is unknown.

CASE XVIII (Ricard,¹ August 2, 1889).—Adult, male, fell from a high place, dislocating his right hip. Several attempts were made during the first few weeks following the accident to reduce it, but without success.

When Ricard saw the patient, eight months after the injury, he presented the symptoms of an ischiatic dislocation. Walking without the aid of crutches is impossible, and the mobility of the head of the femur is such that the limb cannot furnish to the trunk a point of support. Walking, prolonged standing, and the sitting position provoked severe pain, so the patient earnestly asked for surgical intervention. Consequently Ricard operated as follows: He uncovered the head of the femur by a posterior incision placed over the prominence formed by the dislocated head, resected the femoral sphere, separated with a rugine the capsule adherent to the acetabulum, and after having mobilized and pushed in front this capsule, enlarged with a gouge and mallet the deformed acetabulum. This done he placed in the reconstructed cavity the stump of the femoral neck. Cicatrization was rapid and a new joint formed owing to the movements communicated to the thigh at the end of six weeks. The patient stayed in bed until October 6, walked with crutches until October 29, then, with the aid of a cane, left the hospital eighty-eight days after the operation.

Some months later he presented the following condition: The thigh was straight, but still a little atrophied. A new joint had become established between the neck and acetabulum, and the crepitus, which was clearly perceived on motion of the hip, demonstrated the contact of two bony surfaces. This new joint was solid, and the patient standing on the well limb could execute movements of flexion, adduction, and slight abduction. There were four centimetres shortening.

¹ Bull. de la Soc. de Chir., November, 1890 (Reports by Nélaton), and Le Mercredi Méd., November 26, 1890, p. 587.

CASE XIX (C. T. Parkes,¹ June 6, 1890).—F. G., thirty years old; American; farmer; applied for treatment of a backward dislocation of the right hip of five months standing, giving the following history:

January 3, 1890, while handling sacks of wheat in a mill, a sack weighing 120 pounds fell a distance of twelve feet, striking him on the hip. He was in a bent-over position in the act of picking up another sack. He was thrown to the ground and a tier of sacks rolled over him. The physician called diagnosed a backward dislocation. The patient was anesthetized and the dislocation reduced according to the judgment of those present, after manipulation lasting one and one-half hours. Splints were applied and left in position four weeks. Two weeks later the patient noticed that the joint was not normal, and at the end of five months his doctor found that an unreduced dislocation still existed, and sent him to Dr. Parkes. Upon arrival the patient walked with a severe limp, suffering much pain at every step. The head of the bone was felt in the ischiatic notch and the other signs of a backward dislocation were present. Two attempts were now made at reduction under anesthesia, the first by means of manipulation, the second by means of manipulation and extension with the use of the compound pulley, but reduction was impossible. Notwithstanding the fact that much force was applied the head did not move in the least. Four days after the second attempt an incision nine inches in length was made over the joint in the ischiatic fossa, a portion of the cartilage covering it having been loosened, probably by the forcible manipulations. It was very difficult to find the acetabulum, because it was covered with new connective tissue and the muscles of the anterior surface of the thigh were drawn tightly over it.

A transverse incision four inches long, extending forward from the middle of the original incision, was made to expose the parts. Having freely cut those tissues remaining close to the bone, the muscles were cut, exposing the acetabulum, which was found in a normal condition. There was a thin plate of bone found in the connective tissue surrounding the head. Placing the handle of an instrument in the acetabulum the head was replaced, but only after much manipulation and the application of much force. It was retained in position by means of extension, which was continued for ten weeks. The

¹ N. A. Practitioner, November, 1890, p. 499.

wound was closed by deep and superficial catgut sutures and two rubber drains applied. The patient showed a considerable amount of shock, but rallied nicely. The wound healed well, but became somewhat infected by being accidentally covered with fæces on the fifth day during an evacuation of the bowels with the aid of an enema. The patient was discharged fourteen weeks after the operation, being able to walk without crutches, though he still used them for safety. The position of the limb was normal, and the motion of the joint very fair and constantly improving. The successful reduction was accomplished only after a free separation of all the muscles attached to the great trochanter and upper portion of the shaft by means of the knife, and principally by the use of the raspatory.

CASE XX (Villeneuve,¹ December 1, 1890).—Man, aged forty-eight years, entered Hôtel Dieu, November 18, 1890. Fifty days previous he had received a dislocation of the left hip. There was so much swelling and ecchymosis at the time that the physician in attendance was not able to demonstrate the dislocation until after fifteen days. Then two attempts at reduction without anæsthesia failed. Upon entering the hospital a subpubic dislocation was easily diagnosed. Walking without crutches was entirely impossible, and difficult and painful even with them.

November 20, fifty-two days after the accident, attempts at reduction under chloroform with the aid of pulleys, traction, and manipulation for an hour were unsuccessful. He was then put to bed for some days, when it was resolved to make another attempt at reduction under chloroform, which, if not successful, was to be followed by arthrotomy.

Accordingly, on December 1, the patient was put to sleep, when, reduction continuing impossible, a vertical incision was made on the anterior surface of the thigh to one side of the anterior inferior iliac spine. The muscles were divided until a resistant fibrous plane was reached, which was likewise divided layer by layer. Thus was formed a contractile opening through which the finger felt the base of the neck of the femur and the anterior semicircumference of the head. In order to facilitate the manœuvres the incision was enlarged to twenty centimetres. Through this large opening one could feel and even encircle the neck. The manœuvres of reduction were repeated, but always without success. With difficulty a crotchet was passed

¹ Rev. d'Orthop., May, 1892, p. 161.

around the neck of the femur, and by making traction on this while the limb was placed in flexion, adduction, and internal rotation, many efforts were made to replace the head in the cotyloid cavity, but without success. It was, moreover, impossible to feel the cotyloid cavity which was separated from the finger by a thick layer. It was necessary, in order to insure its integrity, to make another incision farther out, but it appeared preferable, in order not to prolong an operation already long and laborious, to practise osteotomy. The external lip of the wound was drawn strongly outward, while with a large Macewen chisel the trochanter was divided through its inferior third. The member was then easily placed in a straight normal position, a dressing applied, and the limb placed in a Bonnet's splint. The operation lasted nearly two hours. The recovery was aseptic and without notable incident.

The patient left the hospital on March 1, 1891. The limb was in a normal direction with a slight flexion upon the pelvis. There were about four centimetres shortening. Flexion at the hip was limited, so that when he wished to sit down he did it by leaning on the right side and stretching out the operated limb. He could dress himself without assistance, except putting on his stockings. Fifteen months after the operation he walked with the aid of a cane, limped after walking fifteen minutes, and after walking much had pain in the anterior region of the thigh.

CASE XXI (Hughes,¹ December 5, 1890).—T. B., an eleven-year-old boy, was admitted to the hospital September 20, 1890. He stated he was running behind and pushing a swinging boat when he slipped under it. On its return the boat struck his right knee, dislocating the hip.

He was seen by Mr. Hughes, who, with Mr. Lucy's assistance, attempted reduction under chloroform. This failing, he was brought to the hospital for a farther attempt with the pulleys. On admission there was a contusion over the front of the right knee, and the right leg was everted, abducted, and shortened to an extent of two and a half or three inches. The head of the bone could be seen and felt lying half-way between the umbilicus and Poupart's ligament. Both trochanters could be easily felt on rotating the limb. There was considerable effusion of blood into the soft tissue around the joint. The femoral artery could be felt pulsating on the inside of the lesser

¹ London Lancet, January 23, 1892, p. 194.

trochanter. Methylene was given and reduction again attempted by means of pulleys and manipulation. The head of the bone could not be got below the pelvic brim by any means. He was then put to bed with extension. In a few days there was widespread ecchymosis over the lower half of the abdomen, perineum, and right thigh. While awaiting absorption of the effusion he developed an attack of acute rheumatism which delayed the operation until December 5, when methylene was given and an incision four inches long made over the neck of the femur. The head was exposed, and all the ligamentous and muscular attachments to the neck and great trochanter were divided. Traction was then applied without effect. The tip of the great trochanter was found to be separated and a large amount of periosteum stripped from the back of the femur. At the back of the femur connecting the shaft with the back of the acetabulum was an elongated mass of bone formed by the periosteum which was stripped from the back of the femur. The neck was sawed through and the head removed. Traction was again applied without result. The wound was then closed. Six weeks later, when he got up, there were two inches shortening.

In July, seven months after the operation, he was able to walk well with a high boot. The hip was quite stiff and two inches shortening present. The cause of the irreducibility was never determined.

CASE XXII (Helferich,¹ May 19, 1891).—A four-year-old girl, fourteen days before, while walking, fell. She could not arise herself, and had to be carried home. She complained of pain in the left hip and thigh. A physician ordered a salve to be rubbed in, but not improving she was brought to the clinic May 14, 1891, the thigh was slightly flexed, adducted, and rotated inward. Shortening from anterior superior iliac spine to patella four centimetres, great trochanter three centimetres above Nélaton's line. Diagnosis, dorsal dislocation. Under anæsthesia reduction was impossible.

May 18, an incision seven to eight centimetres in length was made a finger's breadth external to the anterior superior iliac spine, extending downward in the direction of the limb between the posterior border of the sartorius and the tensor vaginæ femoris muscles. By a blunt dissection the acetabulum, which was normal and empty, was laid bare. External to the acetabulum the head could be felt, though

¹ Deutsche med. Wochens., August 10, 1893, p. 761.

not yet free, as the capsular ligament intervened, the tear in it having already healed. By retracting the wound with Langenbeck's retractors, the interposing soft parts—that is, the capsule, extending from and covering the head and neck of the femur—were divided. By moving the thigh the opening in the capsule enlarged so that the intact cartilaginous covering of the head could be felt, and reposition accomplished. This occurred by drawing outward and at the same time rotating outward the leg. All movements were now free, but luxation easily recurred upon adduction, therefore after closing the wound the limb was fixed in abduction. The progress was favorable; highest temperature 38° C. on the evening of the operation, after which it was normal.

May 25 the stitches were removed; June 1 the wound was healed, the splints removed, and passive motion began. In consequence of the first passive motion a slight joint irritation with a tendency to adduction appeared, which was corrected by putting on a little extension for a few days.

June 10 the patient could walk without support, and passive motion only in extreme excursion slightly hindered. After two years no abnormality could be detected.

CASE XXIII (Tillaux,¹ June 9, 1892).—Man, aged fifty years. Owing to a misstep he fell on his back and was run over by a wagon, which passed over the external part of the right hip near the middle. It produced there only a slight excoriation, but at once, owing to the traumatism, the limb assumed the position of a downward and forward dislocation. The dislocation was mistaken during the first few days, and no attempt at reduction made. At the end of eight weeks, the movements of the hip not returning, he went to Verdun to Dr. Lescuyer, who recognized the lesion, and took the case to Tillaux.

June 8 examination showed flexion sixty degrees with abduction and rotation outward so pronounced that only the external border of the femur and the knee rested on the bed when he was lying down. On palpation the head could be felt displaced markedly inward, internal to Scarpa's triangle under the adductor muscles, near the middle line from which it was separated by not more than a finger's breadth. Passive movements were very limited, and painful and active motion very difficult. After two unsuccessful attempts to

¹ Rev. d'Orthop., January, 1893, IV, p. 27.

reduce by force had been made, the following operation was done June 9:

An incision ten centimetres long was made parallel with and behind the tendon of the adductor magnus to the gluteo-crural fold. This incision conducted directly to the head, which was resected at its junction with the neck with mallet and chisel. After this extraction nothing was easier than to put the limb in its normal position, the neck itself passing into the acetabulum. The acetabulum presented relatively little alteration, and it was not necessary to touch it. The progress of the case was favorable. The leg was maintained in extension, combined with continuous traction, after the method of Tillaux. The apparatus was continued until the early part of August, completely immobilizing the leg until that time. The patient remained in bed during the month of August, but was able to move about. From the commencement of September he got up and walked with two crutches, and after a fortnight with two canes. He left the hospital at the end of September. At the time of departure there was no deformity apparent. It was necessary to examine very carefully to find perhaps a little flattening over the trochanteric region. Measurements showed no difference in the legs, either in length or circumference. He could execute all movements to a limited extent. Rotation normal, flexion to ninety degrees, abduction and adduction same as on the healthy side. Walked easily with a cane, but could do without it. When walking, nothing showed on inspection that an operation had been undergone.

CASE XXIV (Küster,¹ September 23, 1892).—On September 19, 1892, there came to the Marburger clinic a strong, nine-year-old boy who seven weeks previously had fallen from a tree. He could not get up on account of pain, and was carried to bed. The physician did not recognize the character of the injury, and simply ordered rest in bed for the first fourteen days. On attempting to walk a considerable shortening of the right leg was observed. The leg remained flexed somewhat and strongly adducted, and was very painful; however, the patient learned to walk a little with crutches, only the tip of the foot touching the ground. An examination showed a typical dorsal dislocation of the femur. The head of the bone on rotation was easily felt on the dorsum ilii, and the trochanter was two and a half inches above Nélaton's line. Active flexion and extension of the hip-joint

¹ Deutsche Zeitsch. f. Chir., Bd. XXXVII, p. 373.

to about 130 degrees was possible, but abduction and rotation were entirely impossible. Passive rotation to a slight extent was possible, though painful, while passive abduction was entirely lost. September 20 reduction under anæsthesia was attempted, but failed.

After being convinced of the impossibility of reduction, it was concluded, in consideration of the complete uselessness of the limb, its painfulness, and the youthful age of the patient, to attempt its reduction by operation, and in case of failure to reduce, resection was kept in view. September 23, under ether narcosis, Langenbeck's incision for hip-resection was made and the head and neck laid bare. The head lay in a complete, new-joint capsule from which upon incision clear synovial fluid escaped. The capsule consisted of thickened connective tissue, smooth within, and showed no bony growth. As free movements of the head were not yet possible, all the soft parts were separated from the trochanter as in a resection, all tight bands were divided, and so the head and neck cleared as far as the lesser trochanter. Upon attempting to raise up the head, the physicians were very much surprised to find the ligamentum teres somewhat thicker and shorter than normal, extending from its old insertion point in the head of the femur to the bottom of the new fibrous joint capsule. The otherwise completely movable head remained fast to this band after all other connections had been divided. This new-formed fibrous, vessel-containing band was divided, and only then could the head be raised out. The head was not deformed, nor worn away, and one could see where it had been lodged above and external to the border of the acetabulum. The acetabulum was entirely filled with a vascular connective tissue, and the cartilage so overgrown that no hole remained in which the head could be placed.

With a chisel and sharp spoon the acetabulum was excavated as in Hoffa's operation for congenital hip-dislocation. The joint cartilage was evidently destroyed, as upon deepening the cavity nothing was seen of it. After the cavity had been restored the head of the bone was returned to it without difficulty, although it showed a great tendency to redislocate itself upon motion, so the cavity was deepened a little more with a sharp spoon and made to correspond as nearly as possible with the shape of the head, then, after placing an absorbable bone drain, the soft parts were sewed over the reduced head with *étage* catgut sutures, thereby fixing it somewhat in place. The skin wound was sutured, extension with adhesive plaster on a T-splint applied, and the limb placed in an abducted position.

September 28, a small stitch abscess formed in the skin wound. These sutures were removed, while the *étage* stitches remained. The right limb was in a normal position and of the same length as the left one.

October 10, patient could sit up in bed straight without pain. Wound healed except a superficial line of granulations. October 13, by way of trial, the extension bandage was removed, but after flexion and adduction movements suddenly there again occurred adduction, rotation inward, and shortening, and the hip pained him. Evidently there was a tendency to recurrence. After easily reducing the head, the extension bandage was immediately reapplied and the limb placed in strong abduction. In order to insure the retention of the head in the acetabulum a second adhesive plaster was applied perpendicular to the trochanter major so as to press the head directly into the cavity. This strip passed transversely around the pelvis and over a roller in the middle of the side of the bed. A corresponding counter-extension to the other side prevented the sliding of the patient.

November 13, after one month of this threefold extension-dressing, he was again allowed to sit up. Flexion at the hip was now free and painless.

November 19, the extension dressings were removed, the limb was normal, and the head in the acetabulum with motion free.

November 24, the patient got up and made the first attempt at walking with a Volkmann's walking apparatus.

December 5 he was discharged, walking well with a cane and without pain.

August 5, nine months after the operation, the patient was again examined. He was on his feet the whole day without fatigue. He could walk hours at a time and run and jump without difficulty. The position and length of the limb were normal, and its muscles strong. Active and passive motion were as free and smooth and as extensive as in the other leg. The functional result was ideal.

CASE XXV (Gerster,¹ December 20, 1892).—M. W., eight years of age, was admitted to Mt. Sinai Hospital December 17, 1892. Seven weeks previously he had been run over by an express wagon, injuring his left hip. He had considerable pain at the time and had not been able to walk since. His condition had evidently not been recognized, for on admission there was marked inversion of the left leg, shorten-

¹ ANNALS OF SURGERY, May, 1893, p. 586.

ing of one and five-eighths inches, and the head of the femur could be plainly felt on the dorsum ilii. Previous treatment had consisted of a splint to the leg at the time of the accident and a plaster-of-Paris splint applied two days before admission. Manipulation of the thigh caused pain, and there was paralysis of the anterior tibial group of muscles.

December 20, under chloroform, reduction was attempted but failed. A longitudinal incision five inches long was then made with its centre corresponding to the great trochanter. Muscular tissues and capsule were incised nearly its entire length. The head of the femur was exposed, covered with a thin layer of granulation tissue. The base of the head was also covered with granulations and the acetabulum almost obliterated by them. A portion of the Y-ligament had to be cut away before the head could be brought by manipulation into the contracted acetabulum. The capsule was closed with catgut and the wound sutured, except at its centre, where iodoform gauze drainage was instituted. The limb was partially abducted and fully extended and an extension apparatus applied. But slight reaction followed the operation. On the ninth day the wound was dressed. It was clean and aseptic and there was no discharge. Three weeks after the operation the patient was out of bed. Passive abduction and external rotation were limited. Active flexion and extension were good, but rotation outward could not be accomplished. There were talipes equinus and inversion of the foot and an area of anæsthesia over the whole dorsum of the foot. Over the anterior tibial group there was diminished faradic and galvanic reaction.

The patient received on alternate days galvanic and faradic currents, and left the hospital February 17, with a little improvement in the paralytic symptoms. The head of the bone remained in the acetabulum, and he was able to walk with the aid of a cane. On presenting the boy before the New York Surgical Society, March 8, 1892, two and a half weeks after he left the hospital, and two and a half months after the operation, it was found that dislocation had recurred since leaving the hospital. It seemed that the presence of the mass of granulations in the acetabulum, found at the time of the operation, and the subsequent atrophy and yielding of the capsular cicatrix, were important elements in explaining the recurrence of the dislocation, which, however, differed somewhat in degree from the original condition. The head was now occupying a position close to the margin of the acetabulum, but it was probable that the deviation

would be increased in the course of time. There was no traumatism to account for the displacement.

These cases, which comprise all the operations which have been performed for the relief of old unreduced dislocations of the hip that I have been able to gather from the literature at my command, may be divided into four classes,—

(1) Subcutaneous operations, division of the capsular ligament and contracted tendons, followed by attempts at reduction.

(2) Osteotomy of the shaft of the femur with correction of the position of the leg, the head of the bone being allowed to remain in its abnormal position.

(3) Resection (*a*) of the head alone; (*b*) of the head, neck, and trochanter major.

(4) Arthrotomy with reduction of the dislocation.

The first method we find to have been tried twice, Cases II and IV.

In Case II, a dorsal dislocation, the ilio-femoral ligament was divided subcutaneously, as well as the tensor vaginæ femoris muscle, but without the slightest benefit, as reduction remained impossible.

In Case IV, subcutaneous division of the obstructing muscles was likewise unsuccessful, and the head of the bone had to be resected.

That subcutaneous division of the capsular ligament, or the surrounding muscles, can be of no material aid in effecting a reduction will be readily understood when we come to consider the causes of the irreducibility.

The second method, or osteotomy, has been tried in three cases, Nos. VI, VII, and XX.

In Case VI the result was bad. There was still marked deformity, 40 degrees of abduction, an angularity was present at the upper end of the femur, and so much shortening existed that only the tips of the metatarsal bones could be made to touch the ground when standing, and walking was difficult.

Case VII is said to have had a straight and useful limb with a few centimetres shortening one month after the operation. Further details as to range of motion are not given.

In Case XX arthrotomy was performed with a view of effecting reduction, but after repeated unsuccessful attempts with the joint open, it had to be abandoned and the bone was divided through the lower third of the trochanter. The result cannot be called good as there were four centimetres shortening and motion was limited, so that when he wished to sit down he had to rest his weight on the right gluteal region while the left leg remained stretched out. After fifteen months he walked with the aid of a cane, and if he walked much he limped and had pain in the anterior region of the thigh. However, the result was an improvement on the patient's previous condition. Villeneuve (*loc. cit.*), the operator in this case, said, "I do not believe that a resection of the head would have given a result much superior, particularly if the cotyloid cavity had been found filled and effaced, as is possible and even probable, and if one had failed to excavate it with a chisel. I regard, nevertheless, that resection is the operation of choice, and should be made without delaying to attempt reduction, which is almost always impossible. But when from any reason resection is not practicable—and in the actual case it would have been without doubt very laborious—it is well to know that a straightening of the limb by osteotomy gives, on the whole, results very acceptable."

As osteotomy leaves the head in its abnormal position and consequently fails to relieve the severe pain which so frequently accompanies these old dislocations, likewise cannot improve the limited mobility which is always present, it cannot be considered in any way an operation of choice.

As belonging to the third class we find thirteen operations (Nos. I, III, IV, V, VIII, X, XII, XV, XVI, XVIII, XXI, and XXIII), in ten of which the head alone was resected, in two the head, neck, and trochanter were removed, and in one the amount removed is not stated. In the majority of these cases the operator started out, not with the idea of doing a resection, but with the view of effecting reduction by arthrotomy, and only after repeated unsuccessful efforts to restore the head to the acetabulum was resection decided upon, as offering the only means of bringing the limb into a straight and useful position.

That so many good operators should fail to effect reduction, even after the joint is freely opened, makes it necessary to inquire into the causes of this persistent irreducibility.

In the first place, we find that the rent in the capsular ligament through which the head of the bone escaped, closes quite early. Thus in Case VIII, of something over a month's standing, the rent had closed tightly about the neck of the bone, and in Case XXII, of only eighteen days' standing, the tear in the capsular ligament was found already healed. It is very evident that after this rent has closed, the head of the bone cannot be made to enter the acetabulum without again tearing an opening in this ligament. Then in nearly all the cases of any standing the acetabulum is described as being filled or covered up. The untorn portion of the capsular ligament falls over and acquires attachments to the border of the cavity, which is gradually filled with new connective-tissue proliferation. Thus in those cases where the state of the acetabulum is mentioned we find it stated in Case V, of seven months' standing, as being "filled up with condensed cellular tissue and inflammatory material;" Case XV, of two and a half months, "no sign whatever of the acetabulum." Case XVI, of 120 days, "acetabulum was filled with solid matter;" Case XVIII, of eight months, "acetabulum deformed." Case XIX, of five months, "covered with new connective tissue." Case XXIV, of seven weeks, "acetabulum entirely filled." Case XXV, seven weeks, "acetabulum nearly obliterated by granulation tissue."

In the author's case the cavity was covered by the anterior portion of the capsular ligament, and almost completely filled with a dense connective tissue new growth. The only exceptions to this rule are Case XIX, of one year, where the acetabulum is described as "empty," and Case XXIII, of eight weeks, where the acetabulum presented "relatively little alteration."

Closure and filling of the acetabulum with capsular ligament and new connective tissue must thus be looked upon as one of the chief causes interfering with the restoration of the head to its normal position, and this may occur as early as seven weeks (Case XXV) after the dislocation is produced.

Thirdly, may be mentioned a restoration or re-attachment of the ligamentum teres. Thus it is mentioned in Case VIII that "the round ligament preserved its normal connection with the head, and was adherent to the articular cartilage."

In Case XXIV, "the ligamentum teres, somewhat shorter and thicker than normal, extended from the old insertion point in the head of the femur to the bottom of the new fibrous joint capsule. The otherwise completely-movable head remained fast to this band after all the remaining fibres had been divided. This new-formed, vessel-containing, fibrous band was divided, and only then could the head be raised out."

In order to determine the length of time necessary for the acetabulum to become filled with new connective tissue, and also as to whether the round ligament may be restored, and acquire new attachments after dislocation, Volkmann¹ undertook some very interesting experiments on dogs and rabbits.

He would produce a dislocation of the hip in a dog or rabbit, and after a certain variable length of time, cut down upon it and examine the parts. He found that the granulation tissue, which filled the acetabulum, arose, on the one hand, from the remains of the round ligament at the bottom of the cavity, and, on the other hand, from the torn capsular ligament, and the many torn soft parts, which are now drawn over the acetabulum by the dislocated head.

This granulation tissue in the dog, on the twelfth day, is still very soft, and easily wiped out of the cavity, offering at this time no hinderance to reduction, for the soft granulations would be crushed in the cavity by the reduced head and absorption occur. After fourteen days in dogs, such a reduction is followed by complete *restitutio ad integrum*.

After three and a half weeks the new connective tissue was much firmer, and adhered everywhere to the cartilage; however, it could be stripped off this with some force, the cartilage itself remaining uninjured.

At the end of eight or ten weeks, on the contrary, a very

¹ Deutsche Zeitsch. f. Chir., Bd. XXXVIII, p. 373.

hard fibrous mass filled the joint which in itself would make reposition impossible. It adhered inseparably to the bottom of the cavity. The cartilaginous covering of the latter, to which the connective tissue has grown fast, showed on microscopical sections its normal structure in most places, while in other places it was beginning to become fibrous, and show transitions from hard connective tissue to cartilage.

In regard to the round ligament, it was found that in new joints formed under favorable circumstances, it was often reproduced entirely, even after being separated close to the head, so that in fact the new-formed joint was extremely like the old one. This band could not be considered as the old ligament which had been separated close to the bottom of the cavity, and dislocated outward with the head, becoming attached again by its torn end. This was impossible, firstly, because in the experiments the band was divided close to the head, the greater part remaining in the cavity, and, secondly, because in animals one can follow the new growth of the band.

After twelve days the small remains of the ligamentum teres on the femoral head were found changed into a prominent granulating growth, which evidently has a tendency to attach itself to the likewise granulating inner surface of the new capsule. After twenty-three days the union was complete, a band of young connective tissue, which is always stretched and lengthened by the movements of walking, extended from the fossula capitis to the bottom of the new joint. This band, which at the end of three and a half weeks, was still soft and easily torn, became later very firm and tendinous, and in favorable cases, after ten or twelve weeks, was distinguishable only by its irregular form and false insertion from a normal ligament.

As the last, but not least, factor interfering with reduction may be mentioned the shortening of all the muscles and tendons inserted into the upper end of the femur, and the adhesions or new capsule formed about the head. This shortening is simply the usual contraction which all tissues in the body undergo when abnormally relaxed, and in old cases is one of the most important elements in preventing reduction.

After this review of the hinderances to reduction, it is easy to see why so many of the earlier operators failed. Out of twenty attempts to reduce with the joint freely opened, eleven, or 55 per cent., were unsuccessful and ended by making a resection.

This was owing to the fact that when they found the acetabulum filled no attempt was made to excavate it; when it was impossible to bring the head down to the level of the acetabulum owing to the shortening of the pericotyloid muscles they resected the head, thus shortening the neck and accommodating it to the shortened condition of the surrounding soft parts. In so far as the results of resection are concerned they can, on the whole, only be classified as fair. The mortality was *nil*. The amount of shortening of the leg in Case XXIII, none; Case V, two and a half centimetres; Case XVI, three to four centimetres; Cases III, XV, XVIII, four centimetres; Case XXI, five centimetres; while in Cases I, IV, VIII, X, XI, and XII, the amount is not stated. As regards motion, Case V could run, jump, play cricket, and ride a tricycle; Case VIII, movements free in all directions; Case III, could not raise the leg from table when lying down, passive motion slight, walked with cane, marked limp; Case XV, some motion in hip, walked with aid of cane and high shoe; Case XVIII had some active motion; Case XXIII could execute all movements to a limited extent; Case I, simply stated patient had a useful limb; Cases IV and X result simply stated as being good; Cases XVI and XXI had stiff hips; and in Cases XI and XII, results are not stated.

Coming now to the fourth of our classification of operations, or arthrotomy with reduction, we find nine cases, Nos. IX, XIII, XIV, XVII, XIX, XXII, XXIV, XXV, and XXVI. Of these, Case IX, an old alcoholic, died in four days from foudroyant gangrene; in XIII and XIV, details are lacking and the results are not stated; Case XXV had a spontaneous recurrence of the dislocation soon after leaving the hospital. He had talipes equinus and inversion of the foot with partial paralysis of the anterior tibial group. When he left the hospital, less than two months after the operation, he had good motion in the hip and could walk with the aid of a cane. In the remaining five cases,

XVII, XIX, XXII, XXIV XXVI, reduction being accomplished, there was no shortening or deformity in any of them. They all recovered with movable joints.

Case XVII, at the end of eleven weeks was walking around with the aid of a cane and crutch, without pain, the range of motion limited, but continually increasing. He left the hospital then and was lost sight of. Case XIX was discharged at the end of fourteen weeks, being able to walk without crutches, position of the leg normal, motion fair and daily improving. Case XXII could walk without support in four weeks. Motion was only in extreme execution slightly hindered. At the end of two years no abnormality could be detected. Result perfect.

Case XXV, nine months after operation he was on his feet the whole day without fatigue, could walk hours at a time, and could jump and run without difficulty. Motion as free and extensive as the other side. Case XXVI, four months after the operation walked without support, no pain in hip, good, active motion in all directions which was daily increasing in extent.

A consideration of these results shows, as might have been *a priori* expected, that the operation of arthrotomy with reduction has given much the best results.

That the operation is not an easy one the many failures attest, but as these failures were due, first, to unfamiliarity with the causes preventing reduction, thus leading to second, unfavorable incisions and methods of approaching the joint, and third, to lack of thoroughness: it is to be expected that they will be less common in the future. In most of the failures the incision was made directly over the dislocated head of the bone, thus bringing the head and neck between the operator and the acetabulum, making it impossible to reach and excavate the cavity until the head was removed.

Nicoladoni (*loc. cit.*) was the first to recognize the importance of a properly-placed incision, and recommended that it be placed anteriorly in posterior dislocations and posteriorly in anterior dislocations.

A better rule, and the one here advised, is to place the incision where it will lead directly to the acetabulum, and at the same

time permit easy access to the trochanter major. This, in the great majority of the cases will be found to be in front, as in the author's case, along the posterior border of the tensor vaginae femoris, between it and the gluteus medius. This leads directly to the acetabulum, and the head, neck, and great trochanter can be easily reached and denuded.

A single straight incision is all that is necessary, and the Y- and T-shaped incisions, as in Cases IV and VIII, are not to be recommended. The head and neck are then to be denuded, together with a division of all the muscular attachments into the great trochanter and shaft as far down as the lesser trochanter. The muscular attachments are better separated subperiosteally as much as possible so that when they regain their attachments there will be less derangement. This denudation must be thorough, so that the entire upper end of the femur is perfectly free, otherwise it will be impossible to bring the head of the bone opposite the acetabulum, owing to the contraction of the soft parts.

The very close proximity of the great sciatic nerve to the head in posterior dislocations should not be forgotten.

After freeing the upper end of the femur, the acetabulum, if filled, should be excavated with a sharp spoon or gouge and mallet. No pains should be spared in the use of the gouge to enlarge the cavity sufficiently to permit the easy entrance of the head. The head is then returned to the acetabulum, the wound closed, extension applied, and the limb immobilized in a slightly abducted position.

Owing to the tendency of the dislocation to recur, as shown in Cases XXIV and XXV, the extension and immobilization should not be discontinued too early, perhaps not under four weeks in old cases.

In closing I would present the following conclusion :

(1) That owing to the danger of fracturing the neck of the femur,¹ laceration of the great vessels of the thigh,² and shock,³ and death (*loc. cit.*), the application of great force to reduce old

¹ Archiv f. klin. Chir., 1885, No. 32, p. 440.

² ANNALS OF SURGERY, June, 1892, p. 425.


³ Rev. d'Orthop., September, 1890.

dislocations of the hip should be discontinued in favor of arthrotomy.

(2) That subcutaneous operations in old dislocations are without benefit.

(3) That osteotomy below the trochanter could scarcely come into consideration at this day.

(4) That resection is only to be thought of when reduction by arthrotomy fails; and, finally,

 (5) That the operation which has given the best results is free arthrotomy with reduction after the method here described.

CASES OF OPERATIVE REDUCTION OF OLD HIP-JOINT DISLOCATION.

Case No.	Operator.	Date.	Age.	Variety.	Duration.	Operation.	Incision.	State of Acetabulum.	Results.
I.	Delagarde.	Sept. 1, 1866.	51 years.	Sciatic.	6 months.	Resection of head.	From trochanter to sacrum.	Not stated.	Had a serviceable limb. Amount of shortening and range of motion not stated.
II.	Hamilton.	Feb. 24, 1869.	28 years.	Dorsal.	8 months.	Subcutaneous division of ilio-femoral ligament and tensor vaginae femoris muscle.	. . . . .	. . . . .	Failure; could not reduce; tenotomy of no benefit.
III.	Volkmann.	May, 1876.	51 years.	Perineal converted into dorsal.	3½ months.	Arthrotomy; failure to reduce followed by resection below trochanter.	Straight over trochanter with a small transverse cut of muscles.	Covered by a musculo-fibrous layer.	Nine months after operation 4 cms. shortening; slight active motion, but cannot raise leg from table; walks with cane; moderate limp.
IV.	MacCornac.	1878.	Adult.	Thyroid.	20 months.	Subcutaneous tenotomy without benefit, followed by resection of head.	Y-shaped over trochanter.	Not stated.	Said to have been good, but no details given.
V.	Sidney Jones.	Nov. 25, 1879.	11 years.	Dorsal.	7 months.	Resection of head.	. . . . .	Filled with condensed cellular tissue and inflammatory material.	Five years after operation 1 inch shortening; good use of limb; can run, jump, play cricket, and ride a tricycle.
VI.	Koch.	Oct. 3, 1881.	41 years.	Sciatic.	20 months.	Osteotomy just above trochanter minor.	. . . . .	. . . . .	Not good; great shortening and marked deformity.
VII.	Wahl.	Feb. 16, 1882.	. . .	Dorsal.	25 days.	Osteotomy below trochanter major.	. . . . .	. . . . .	Useful limb, with few centimetres shortening.
VIII.	Wm. Adams.	Mch. 29, 1882.	11 years.	Dorsal.	More than a month.	Subcutaneous tenotomy of adductor longus; no benefit; followed by resection of head.	T-shaped over head and neck.	. . . . .	Seven months after operation limb straight and motion free in all directions; amount of shortening not stated.
IX.	Polatillon.	1883.	46 years.	Obturator.	1½ months.	Arthrotomy with reduction.	Anterior.	. . . . .	Death from acute gangrene in 4 days; old alcoholic.

CASES OF OPERATIVE REDUCTION OF OLD HIP-JOINT DISLOCATION—CONTINUED.

Case No.	Operator.	Date.	Age.	Variety.	Duration.	Operation.	Incision.	State of Acetabulum.	Results.
X.	Marguery.	1884.	. . .	Dorsal.	8 months.	Arthrotoomy; failure to reduce; followed by resection of head.	. . . . .	. . . . .	Said to have been good, but details lacking.
XI.	Nicoladoni.	1885.	. . .	Dorsal.	76 days.	Arthrotoomy; failure to reduce followed by resection below trochanter.	Usual incision for resection.	. . . . .	Case suppurated and result not stated.
XII.	Severano.	Oct., 1886.	Adult.	Dorsal.	4 days.	Arthrotoomy; failure to reduce followed by resection of head.	Over head parallel to fibres of glutæus maximus.	. . . . .	Not known; left hospital at end of 30 days, with wound healed; never heard of thereafter.
XIII.	Vecelli.	1887.	. . .	Dorsal.	. . .	Arthrotoomy with reduction.	Anterior.	. . . . .	Not stated.
XIV.	Vecelli.	1887.	. . .	Anterior.	. . .	Arthrotoomy with reduction.	Anterior.	. . . . .	Not stated.
XV.	Quénu.	Sept. 28, 1887.	26 years.	Dorsal.	2½ months.	Arthrotoomy; failure to reduce followed by resection of head.	Posterior, over head of femur.	"No sign whatever of acetabulum."	Five months after operation 4 cms. shortening; motion in hip; can flex to a right angle; walks with aid of cane.
XVI.	Bloch.	Dec. 23, 1887.	17 years.	Dorsal.	120 days.	Arthrotoomy; failure to reduce followed by resection of head.	Anterior between sartorius and rectus, followed by Langenbeck incision for resection.	"Completely filled with solid matter."	Eleven months after operation 3 to 4 cms. shortening; has some motion at hip; can walk without cane, but needs one for long distances.
XVII.	Parkes.	May 12, 1888.	21 years.	Dorsal.	1 year.	Arthrotoomy with reduction.	Posterior, over head and neck.	"Empty."	Eleven weeks after operation left hospital with limb in good position; motion constantly increasing; able to walk with cane and crutch.
XVIII.	Ricard.	Aug. 2, 1889.	Adult.	Ischiatic.	8 months.	Resection of head; neck placed in acetabulum.	Posterior, over head.	"Contracted and deformed."	Some months later 4 cms. shortening; new joint formed; can execute movements of flexion, adduction, and slight abduction.

CASES OF OPERATIVE REDUCTION OF OLD HIP-JOINT DISLOCATION—CONCLUDED.

Case No.	Operator.	Date.	Age.	Variety.	Duration.	Operation.	Incision.	State of Acetabulum.	Results.
XIX.	Parkes.	June 6, 1890.	30 years.	Backward.	5 months.	Arthrotomy with reduction.	Posterior, with extension forward from middle.	"Covered with connective tissue."	Fourteen weeks after operation limb normal in position; motion fair and daily improving.
XX.	Villeneuve.	Dec. 1, 1890.	48 years.	Subpubic.	2 months.	Arthrotomy; failure to reduce followed by osteotomy lower half of trochanter.	Anterior.	Covered by thick layer; could not feel cavity.	Fifteen months after operation 4 cms. shortening; motion slight at hip; walks with cane; limps after walking 15 minutes and has pain.
XXI.	Hughes.	Dec. 5, 1890.	11 years.	Suprapubic.	2½ months.	Arthrotomy; failure to reduce followed by resection of head.	Anterior, over neck of femur.	. . . . .	Seven months after operation 2 inches shortening; hip stiff; car walk with high shoe.
XXII.	Helferich.	May 18, 1891.	4 years.	Dorsal.	18 days.	Arthrotomy with reduction.	Anterior between sartorius and tensor vaginae femoris.	Normal and empty.	Perfect; after two years no abnormality could be detected.
XXIII.	Tillaux.	June 9, 1892.	50 years.	Perineal.	8 weeks.	Resection of head; neck placed in acetabulum.	Behind tendon of adductor major over head.	"Relatively little alteration."	No shortening; after 3½ months motion good; walks without support.
XXIV.	Küster.	Sept. 23, 1892.	9 years.	Dorsal.	7 weeks.	Arthrotomy with reduction.	Straight over trochanter (Lan-genbeck's).	"Entirely filled with connective tissue."	Perfect; 9 months after operation motion as free, smooth, and extensive as other leg.
XXV.	Gerster.	Dec. 20, 1892.	8 years.	Dorsal.	7 weeks.	Arthrotomy with reduction.	Straight over trochanter (Lan-genbeck's).	"Almost obliterated by granulation tissue."	Had paralysis in anterior tibial muscles with talipes; result was good until patient left hospital, when dislocation recurred some 2 months after operation.
XXVI.	Harris.	Feb. 11, 1894.	33 years.	Dorsal.	4 months.	Arthrotomy with reduction.	Anterior between tensor vaginae femoris and gluteus medius.	Covered by capsular ligament and filled with connective tissue.	Four months after operation position normal; no shortening; active motion in all directions limited, but daily increasing; walks without support; no pain.

NEUDÖRFER'S METHOD OF AMPUTATING EXTREMITIES, WITH A REPORT OF TWO THIGH AMPUTATIONS.¹

By A. H. MEISENBACH, M.D.,

OF ST. LOUIS, MO.,

PROFESSOR OF SURGERY IN THE MARION SIMS COLLEGE OF MEDICINE.

THE method of amputating, which I wish to bring to notice in this paper, is one which Professor Neudörfer,² of Vienna, described. My attention was drawn to the method during the winter of 1892. I had the opportunity to practise it experimentally on the cadaver, while practically demonstrating operative surgery before the class. The practical points observed in these experimental studies of the method on the cadaver determined me to execute it on the living subject as soon as an opportunity should present itself. This opportunity presented itself during the last winter, the results of which will be detailed further on in my remarks.

Neudörfer applies the principles of the technique involved in this method both to amputations in continuity and in contiguity. I shall deal in this paper only with amputations in continuity. The amputations in continuity are divided,—

(1) Through regions where there is only a single bone to be divided, as in the thigh and in the upper arm.

(2) Through regions where there are two bones to be divided, as in the forearm and in the leg.

Technique where One Bone is Divided.—The first step in the operation is to determine the point at which the bone is to be

¹ Read before the Missouri State Medical Association, Lebanon, Mo., May 15, 1894.

The sketches of figures were executed by my friend, Dr. Louis Crucius, from photographs taken during operations.

² Wiener medicinische Wochenschrift, Nos. 2 to 5 inclusive, January, 1891.

divided. For example, we will assume that we wish to amputate the thigh at the junction of the lower with the middle third. If the bloodless operation of Esmarch is employed, the limb is first rendered bloodless by the application of the bandage and constrictor. If the bloodless method is not employed, the vessels are controlled either by a constrictor or by the fingers of an assistant. Having determined the point where we wish to divide the bone, an incision is made with a sharp-pointed, strong resection knife, extending downward, in the long axis of the limb, through the soft parts and periosteum. The incision should be made on the lateral or anterior aspect of the limb, where the bone is more

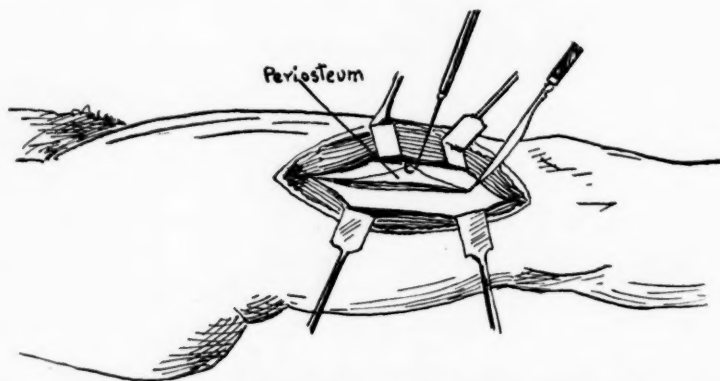


FIG. 1.—FIRST STEP.—Incision through soft parts and periosteum. Soft parts held apart by retractors. Periosteum incised and elevated from bone.

superficial, and where the large vessels and nerves are avoided. In the thigh, the incision should be made about twelve centimetres in length, or about four and a half inches. With large-sized retractors the soft parts are held apart. The periosteum is now thoroughly loosened from the bone in the line of the incision with a raspator. With a chisel the bone is cut through at the upper angle of the wound (line for division), as in an osteotomy. The lower fragment is luxated through the slit in the periosteum, and the membrane (periosteum) carefully stripped from the bone.

The soft parts are now divided at the site of the lower angle of the wound, in one plane transversely to the axis of the limb, with an amputating knife, scalpel, or even with a large pair of

scissors. The vessels are next secured by ligatures. Having secured the vessels, the periosteum is stitched together with a fine catgut, continuous, buried suture, both longitudinally and transversely, obliterating the cavity of the periosteum which was occupied by the bone. The muscles are now united by a continuous, buried, catgut suture, and, finally, the skin in the same manner.

In amputations of the upper arm, the incision is made on the outer aspect of the limb, and is to be about six centimetres, or two and a fourth to two and a half inches in length. The

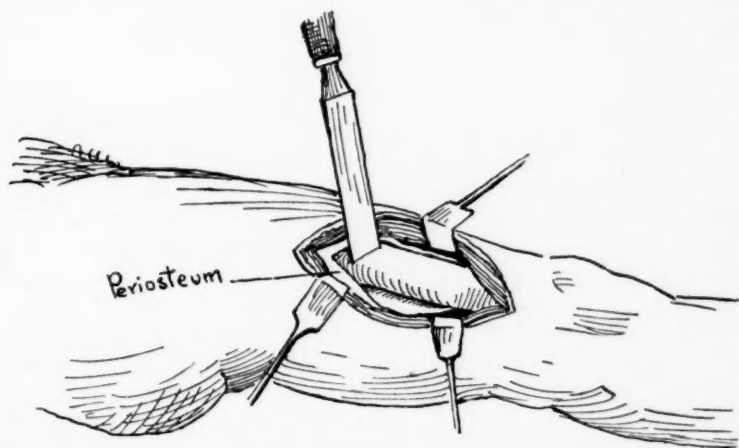


FIG. 2.—SECOND STEP.—Soft parts and periosteum retracted. Chisel in position for osteotomy in upper angle of the wound.

other steps in the operation are the same as described for amputations of the thigh.

Technique where Two Bones are to be Divided.—The same technique is carried out in amputations of the leg and forearm, with the exception that an osteotomy of two bones must first be made before the soft parts are cut through.

In the forearm the incision is made over the middle of the ulna and radius on the dorsal side, six centimetres in length. Here the bones are very superficial. In making the incisions the arm should be kept midway between pronation and supination.

For amputations of the leg the incision is made over the tibia, at the point selected, either on the inner or outer aspect of

the crest, and about nine centimetres in length. Neudörfer prefers the outer aspect. The tibia is first cut through with a chisel, then the fibula is divided either on the same plane or a little higher up. All the other steps are the same as already described, the only difference being that in amputation of the leg and forearm we have two periosteal cavities to obliterate and two skin wounds, respectively, over ulna and radius, or over tibia and fibula.

The arguments brought by Neudörfer against the older methods of amputation are,—

- (1) The irregular division of the soft parts.
- (2) The bone is usually divided higher than necessary.
- (3) Troublesome cicatrices often result.

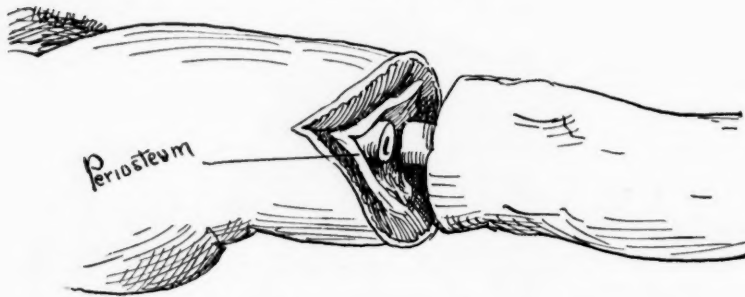


FIG. 3.—THIRD STEP.—Osteotomy of bone at upper angle of wound. Circular division of soft parts at lower angle of wound.

- (4) The saw does unnecessary injury to the bone.
- (5) Periosteal flaps, being deprived of nutrition, do not re-produce bone.

(6) Conical stumps may be formed.

(7) A special set of cumbersome instruments is required.

The advantages of the method suggested by Neudörfer are :

(1) The soft parts remain in their normal relation to each other and cannot retract.

(2) Not being able to retract, a soft cushion is provided for the bone.

(3) The vessels may be controlled by the thumb and finger in the flap; the exact union of the tissues renders secondary hæmorrhage nearly impossible.

- (4) No troublesome cicatrices result.
 - (5) The periosteum retains all its nutritive and osteogenetic properties.
 - (6) Conical stumps are never produced.
 - (7) Skilled assistants are not necessary.
 - (8) Few special instruments are required.
 - (9) Drainage is unnecessary.
 - (10) This is the only real subperiosteal amputation.
- Objections that may be made to the method, are as follows:
- (1) It is new, has no statistics, and lacks the support of prominent men.
 - (2) In amputations of extremities containing two bones the

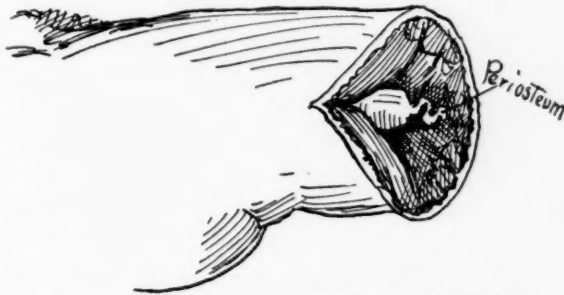


FIG. 4.—Periosteum, sutured muscles, and skin before coaptation by buried catgut suture.

operation seems to be more complicated than it really is; and it certainly requires somewhat more time than the usual methods.

- (3) The method must first be practised on the cadaver.
- (4) Thickened periosteum is easily removed, but normal periosteum is elevated with considerable difficulty. There are no disadvantages from the side of the patient.

Experimental Studies of the Method on the Cadaver.—Having familiarized myself with the technique, I performed the amputations on the cadaver, so as to satisfy myself as to the possibility of the method, and to determine whether it could be risked on the living being, not having any statistics nor the support of any one except Neudörfer himself. I practised both forms of amputations,—viz., where a single bone and also where two bones

were to be divided. The former I performed on the thigh and upper arm, the latter on the forearm. I followed the technique closely in the various steps of the operation. In the thigh I made the incision on the lateral aspect, selecting the junction of the middle with the lower third as the point where the bone was to be divided. In the upper arm I selected the junction of the middle with the lower third. The point of amputation selected in the forearm was the junction of the middle with the upper third.

In these operations I used blocks of wood as a support for the limb during the performance of the osteotomy instead of a sand-bag. I hardly think it necessary to repeat step by step the technique of the various experiments, leaving this to be done in

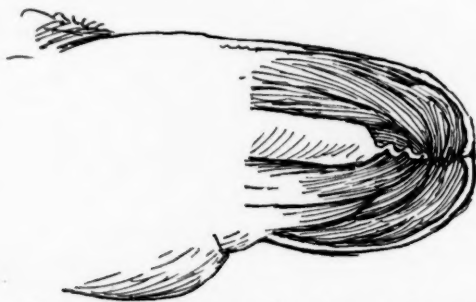


FIG. 5.—Perpendicular section of stump after periosteum, muscles, and skin have been united by continuous catgut suture.

the report on the cases amputated on the living being. I performed a linear osteotomy on the thigh and the same on the humerus. In the forearm I modified this by a partial cuneiform osteotomy. I found that, as far as the resulting stump was concerned, it came up to all expectations,—*i.e.*, a solid, firm, well-cushioned one.

There are two points, however, which also became evident. (1) That some experience is necessary in the performance of the osteotomy,—*i.e.*, so as not to split off or splinter the bone. (2) That some care also is necessary in peeling off the peritoneum, especially at the point where there are strong muscular attachments to the bone; as in the femur in the line of attachments of the adductors, etc.

As "the proof of the pudding is in the eating of it," so also could the other claims of the method be demonstrated only by actual operations on the living being; and it remained for the opportunity to execute them to present itself. The result of my experiments on the cadaver confirmed my original belief, that the method would give a satisfactory result.

In this day of advanced surgery, there is a tendency to overlook many of the other surgical procedures in the *furor* to invade the cavities of the body. Surgeons from the earliest day of surgery have attached a very high degree of importance to amputations; and that the subject was worthy of it is established from the fact of the multitude of methods and forms of amputations that have been handed down to us; and from the illustrious names that are attached to some of them. Volumes have been written on this subject, and the goal, for which all operators and writers have been striving, is the formation of a good stump. It is impossible here to enter fully into the discussion of what constitutes a good stump. The good stump should be of regular outline, firm, solid, insensitive; skin should be mobile; scar should be normal, regular, clean, and lie in a groove in the integument. The bone should be rounded at the end. On this subject, however, I can with propriety quote Treves, in his classical work on "Operative Surgery." "The success of any amputation or method is to be measured, not by the rapidity or brilliancy with which the operation is performed, but rather by the mortality attending the procedure and the quality of the resulting stump. The importance of a sound stump, both as far as it relates to the comfort of the patient and the utility of the mutilated limb, cannot be over-estimated." If we are candid with ourselves, we must admit that it at times takes a great deal of skill and judgment to obtain results that are ideal as far as the qualities of the resulting stump are concerned. We must also admit that many of the poor results after amputations are often due to the carelessness, to the lack of judgment or inexperience on the part of the surgeon. Bungling surgery in the cavities of the body will be covered up, if the patient recovers. Not so in amputations. The "poor job," as expressed in common terms, it always stands as a monument of the skill of the operator.

CASE I.—J. H., aged fifty, married. During late war, in 1861, received a gunshot wound of the right knee-joint. Patient suffered for months on account of the extensive suppuration, which finally resulted in ankylosis. On account of the suppurative process in the leg and thigh, the function of the circulation became so impaired that for the last twenty years the patient has suffered with an extensive eczema of the foot and leg, reaching to the knee. During the last five or six years the foot has been œdematous, and the circulation so impaired that gangrene of one or two toes took place, as well as the formation of plantar abscesses. The toes were removed. The abscesses would not heal. The continual drain on the system undermined the health of the patient, and interfered with his avocation. Five or six years ago, I advised amputation of the limb, but he refused. During the summer and fall of 1893 his health became poor; suffering continually from fever. He now decided to have the leg amputated. His fever having been relieved, as well as an attack of bronchitis, he entered the Rebekah Hospital, December 12, 1893.

Examination of the urine revealed that it was loaded with albumen; no casts. He was prepared for operation for the following day, at 11 A.M. On account of the albumen present in the urine, I felt that possibly some risk might be incurred in the administration of the anæsthetic. In order to reduce the amount of anæsthetic necessary, I ordered one-quarter grain of morphine hypodermically to be given with two ounces of whiskey by the mouth, one hour before the operation, and a similar dose of whiskey one half hour later.

Operation.—Anæsthetic used, chloroform. On account of the previous administration of the morphine and whiskey, the patient came very easily under the influence of the chloroform, and it required very little to keep up the narcosis. Leg rendered bloodless by the Esmarch bandage and constrictor. A sand-bag, 12 by 18 inches, filled with sterilized sand, was used to place under the leg as a support and counter-support during the procedure of chiselling the bone. With a strong resection knife, I made an incision on the outer aspect of the thigh: beginning at the junction of the lower with the middle third, and extending downward a distance of twelve centimetres,—four and one-half inches. The cut was made through the soft parts and periosteum down to the bone. The soft parts being held apart with retractors, the periosteum was peeled away from the bone through the incision in its long axis. I used a curved periosteal elevator, so as to loosen the periosteum on all sides of the bone as much

as possible. Along with the soft parts, it was also retracted away from the bone. The bone was divided by a linear osteotomy at the upper angle of the wound. Division of the soft parts was now done at the lower angle. The division was made with a medium-sized amputating knife, cutting by the circular method at right angle to the axis of the limb, through all the soft parts down to the bone. The lower fragment was now pulled out of its periosteal covering. Vessels were next tied, and the constriction loosened. After the slight parenchymatous oozing had stopped, the wound was sutured. The periosteum was united both longitudinally and transversely, by means of a continuous, buried, fine catgut suture. The various layers of the muscles were also united by a stronger continuous, buried, catgut suture; and, finally, the skin in the same manner. As there were no cavities left in the stump, drainage was not necessary.

The patient made a very favorable recovery. Not any reaction, except on the third day, when the temperature went up to 101.4° F.; but, by opening the bowels freely with a saline purgative, it came down to normal and remained so. Union of wound by first intention. Patient left the hospital on January 9, 1894.

Remarks.—The choice of the site of an amputation is of importance as far as it relates to the limb left. The tendency, at present, is to amputate through sites that will give the best results as to the wearing of an artificial limb; and not to look so much to the conservation of parts. I believe that many of the classical amputations, such as Chopart's, Symes's, etc., will give way to amputations higher up through the continuity of the leg, because an artificial limb can then be adjusted. A good artificial member is better than a poor natural limb. In this case, the ankylosis and the condition of the skin necessitated the choice of site above the knee. Hence, I determined on an amputation at the junction of the lower with the middle third, and by Neudörfer's method. As already stated, I had found, in my experimental studies on the cadaver, that the two points that were a little difficult were the osteotomy and the elevation of the periosteum. On account of the ankylosed condition of the knee, I found it difficult to firmly embed the leg on the sand-bag, so as to form an even resistance to the mallet blows. On this account there was slight splitting of the bone; the spiculæ remaining on the

amputated fragment. In peeling off the periosteum at the site of the insertion of the adductors I found it necessary to use a long blunt-pointed tenotome, in order to facilitate the removal. The slight splitting off of the bone during the osteotomy was productive of no harm, as the osteogenetic properties of the periosteum asserted themselves and formed a perfect rounded end to the bone. This can be demonstrated satisfactorily in the patient's stump. The patient's health has much improved since the operation, and he is now using an artificial leg.

CASE II.—*Amputation for Gangrene Subsequent to an Attack of Grippe.*—J. H., female, age sixty-three, married. Eleven years ago had partial paralysis of right leg. Recovered use of limb after nine months' treatment. Has had good health until November 23, 1893. At this date was attacked by the grippe. During the second week of this attack she complained of coldness and pain in the right foot. In spite of treatment applied to the parts, such as warmth by means of wrapping in cotton and warm irons, this coldness continued. The skin began to become discolored, mottled, and within a few days the evidences of gangrene were present. On consultation it was deemed best to postpone operative interference until her general condition should improve. Under free stimulation, this took place so that on December 18, 1893, she was removed to the Rebekah Hospital. At the time of her admittance into the hospital she was free from fever and the catarrhal symptoms, incident to the grippe, had disappeared.

The line of demarcation of the gangrene was fully established at the junction of the middle with the upper third of the leg. The tissues in the gangrenous portion were beginning to break down. This, then, was the opportune time for amputation; before her powers were again depreciated by the discharges from the breaking down gangrenous tissues.

Operation, 11 A.M., December 19, 1893.—Chloroform anæsthesia, morphia, one-fourth grain, hypodermically; whiskey by the mouth before operation. Amputation of the thigh at the junction of the lower with the middle third; Neudörfer's method. Technique the same as in Case I, with the exception that in this case the incision was made on the anterior aspect of the leg instead of on the lateral, as in the previous case. On day of operation, the evening temperature rose to 101.6° F. Temperature, December 20, the day following

the operation, 99.6°-100.6° F. Gave saline purge and followed this with quinine and phenacetin. Temperature came down to normal and remained there. December 20, saturated dressings were removed. December 21, again dressed and several stitches removed, as there seemed to be some tension in the central part of wound. Union occurred by first intention with the exception of the central part of the wound, where, for about an inch and a half, there was separation of the skin and where union by second intention took place. She left the hospital January 4. Temperature normal and stump in good condition. At home the stump healed completely.

She was sitting up and beginning to walk around on crutches, when one day she drank some buttermilk, brought her by a neighbor. An attack of gastro-enteritis followed, from which she never recovered. She lingered along until April 11, when she died, as I take it, from auto-infection produced by the buttermilk.

Post-mortem allowed. Patient much emaciated and decubital ulcer over nates. Stump healed; a slight red spot that had been present on the extremity over site of bone while living was now gone. Scar somewhat broad in centre, situated posteriorly and movable. End of stump finely rounded and firm. Bone rounded at the end, stump removed. No examination of the organs allowed.

Remarks.—In Case II, I selected the site of amputation at the junction of the lower with the middle third of the thigh for the following reasons: In the gangrene of the aged, where the gangrene begins at the toes and the region supplied by the anterior tibial artery is involved, the experience of German surgeons has proved that a thrombus is likely to extend in the artery to the bifurcation of the popliteal, and sometimes beyond. An amputation below this point, although at the point of election or higher, is often followed by secondary gangrene, and a higher amputation becomes necessary. I have seen examples of this occur in the practice of such men as Hahn and Kuester, in Berlin, so that with them it has become a rule to amputate high up above the bifurcation of the popliteal. As I did not want to take any chances, I did the operation at the site stated.

Neudörfer, at the time of the publication of his paper, had done the operation three times. The first was a thigh operation; the second was also a thigh operation; the third was an amputation of the leg.

The two operations reported in this paper are the only ones, so far as I know, that have been done in this country according to this method. Based on my experiments on the cadaver and the experience gained on the living subject, in the cases above reported, I beg to submit for further consideration the following

CONCLUSIONS.

(1) That the method of Neudörfer is one that offers, from a theoretical stand-point, all the conditions favorable for the formation of a good stump.

(2) That inasmuch as no anatomical relations of muscular planes and tissues contained between them are disturbed, there is the least risk to the vitality of the parts, and the most favorable condition for union by first intention.

(3) Such being the case, the muscles cannot retract, and hence must form a solid firm stump.

(4) That it offers most favorable conditions for a good cicatrix.

(5) That the preservation of the periosteum insures its osteogenetic properties, and therefore the more favorable conditions are preserved for a good contour to the end of the bone.

(6) That in the chiselling of the bone and peeling off of the periosteum no serious obstacles are encountered.

(7) That the chisel is not likely to produce as much injury to the bone as the saw, and therefore not as likely to be followed by a necrosis of the end of the bone.

(8) That, in the main, Neudörfer's conclusions, as far as my experience goes, can be verified.

(9) That it will take further experience, however, on the living subject to place this method on a proper basis as a surgical procedure.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, May 9, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

LEONTIASIS OSSEA.

DR. CHAS. T. PARKER presented a patient, a man, thirty-eight years of age, who came to the Chambers Street Hospital, April 24, 1894, complaining of lancinating headache, impairment of hearing and of memory, drowsiness, despondency, and at times of suicidal impulse. General history negative.

About fourteen years ago the patient received a blow on the top of the head, producing a fracture of the skull. Seven years ago he noticed a small lump near the angle of the left inferior maxilla, which went on to increase slowly until his appearance at the hospital. Five years ago a growth of similar character began under the left eye, and was followed by one under the right eye and another at the angle of the right inferior maxilla and beneath the parotid gland. The nasal passages were nearly occluded.

The headache, of which the patient complained, was confined mainly to the frontal and left temporal regions.

DR. PARKER stated that the bone was solid throughout, as shown by drilling into it. The enlargements were limited to the bones of the head. The special sense and cerebral symptoms were supposed to be due to growth of bone within the cranium. The orbital fossæ and teeth were still in place, but the growth could be felt behind the hard palate and had nearly occluded the nasal fossæ.

CHOLECYSTECTOMY; IMPACTED GALL-STONE IN THE COMMON BILE-DUCT.

DR. CHARLES K. BRIDDON presented a patient and read notes of the case taken by Dr. Forbes Hawkes, as follows: The patient, a

woman, thirty-four years of age, subject to constipation, was admitted to the Presbyterian Hospital on December 27, 1893, with a history of repeated attacks of biliary colic during the preceding five weeks. She was jaundiced, and a dilated gall-bladder could be imperfectly made out.

As the attack seemed to be on the wane when the patient presented herself, it was not considered advisable to undertake operative treatment at that time. She was kept in the hospital, her symptoms gradually subsiding with the tumor until January 22, when she was discharged.

On March 12, 1894, she returned, saying that five days before the old trouble had come back,—the pain in the right side, the chills, the fever and sweating, the constipated and light-colored stools. After a while the jaundice had also reappeared and had been increasing. When seen, the tumor in the right hypochondriac region could be plainly made out, her skin was deeply jaundiced, her dejecta very light-colored, and she complained of much pain over the tumor radiating upward.

DR. BRIDGON then operated, making a "Courvoisiers" incision about ten inches long, running obliquely parallel to the lower border of the ribs on the right side and about one-half inch below them, its centre over the most prominent part of the tumor.

After the peritoneal cavity had been laid open, on inspection no gall-bladder or resembling structure could be seen. In the position of the normal gall-bladder, however, a mass could be indistinctly made out by the examining finger, lying directly under the liver, composed apparently solely of omentum and adherent structures.

On careful blunt dissection with the finger this mass defined itself more clearly. Several rather firm adhesions were separated from it, and an adherent process of omentum, which was seen to run directly into the mass, was ligated off. The mass then showed itself to be the gall-bladder itself, its walls much thickened, the organ itself contracted. The process of the omentum, after reaching out for the inflamed gall-bladder, had evidently wrapped itself around it snugly on all sides and contracted firm adhesions to it throughout.

During the manipulations necessary to its liberation the gall-bladder was opened, liberating twelve to eighteen brown-colored, smooth, facettied stones, varying in size from the head of a pin to that of small dice, but no bile escaped.

After carefully freeing the gall-bladder on all sides from its sur-

rounding adhesions, it was cut off at its termination in the cystic duct below and removed. In doing so several bleeding vessels in the lower part of the wound were clamped. The clamps were left on for forty-eight hours, the mouths of the vessels being at too great a depth in the wound to be tied with safety.

The exploring finger passed down into the wound and along the common bile-duct failed to reveal the presence of any stone.

A probe introduced into the cystic duct failed to pass through the common duct into the intestine.

A drainage-tube of fair size, surrounded by iodoform gauze, was then introduced to the very bottom of the wound over the orifice of the cystic duct and kept in position by means of iodoform gauze packed around it.

Several silkworm-gut sutures were then taken in the two angles of the wound, limiting its extent somewhat, a copious aseptic dressing applied, and the patient returned to the ward.

She recovered well from the operation.

For the first few days the bile flowed out through the tube at the rate of approximately eight to ten fluid ounces a day, then steadily decreased. By the third day after the operation her jaundice was markedly less. Her faeces began to regain a more normal color though still somewhat constipated. The edges of the wound that had been brought together healed *per primam*. The wound itself was protected from the biliary discharge by rubber tissue. Her general condition improved immediately after the operation, the chills, fever, sweating, headache, and malaise ceased, and the patient made an uninterrupted recovery. Two weeks ago the discharge of bile from the wound had ceased entirely.

DOUBLE CHARCOT'S DISEASE OF THE HIP IN LOCOMOTOR ATAXIA.

DR. W. B. COLEY presented a man, a physician, forty-eight years of age, who first noticed, ten years ago, some trouble over the spine,—some pain, irritation on lying down, some change in sensation. Six years ago he noticed some disturbance in gait. When he closed his eyes he was unable to walk as well as when they were open. A year ago last November he fell from his carriage and injured his right hip. A few days afterwards he noticed a swelling over the hip, which increased in size and remained permanent. Six months later a similar swelling appeared over the left hip. A week

ago he had been sent to Dr. Coley with the diagnosis of sarcoma of the hip. On examination Dr. Coley found plain signs of spinal-cord trouble. The pupils responded to accommodation, but not to light; there was almost entire absence of the patellar reflexes, partial loss of sexual power, gastric crises, and such other evidences of locomotor ataxia as to make clear the diagnosis of Charcot's disease of the hip-joints. There was complete dislocation at both hips, and fracture at one, if not both. While standing the trochanters were four inches above the normal position, the joints were entirely disorganized, as shown by crepitus, and the hip could be placed in almost any position without causing pain. Crepitus was very plain in the right hip. Exostoses of considerable size were present on the left side, but originating from the ilium. The knees were not affected. The patient began to use a cane about eighteen months ago, and had gone on to use increasing support until at present it was difficult to get about with double crutches. He had attended to his practice until recently.

DR. BRIDDON remarked that, in this country at least, Charcot's disease of the hip-joint must be a rare condition, for only three cases had come under his own observation. The first was a case of Dr. Peters, at St. Luke's, fifteen or twenty years ago, before Charcot's disease had been recognized in America. The case gave rise to considerable discussion as to the diagnosis. The head of the femur was expanded, and permitted of easy displacement out of the acetabulum, but there were no exostoses on the pelvis.

He thought that in most cases the lesion involved the bone within the capsule of the joint. The bony projections were apt to seriously interfere with mobility.

DR. HOTCHKISS had seen one case of hip-joint trouble attending locomotor ataxia in a hospital patient, the chief cause of the pain and other joint symptoms being attributable to an enormous bursa over the greater trochanter. Only the one joint was affected.

DR. ABBE had seen a case of Dr. Weir's, in which the bony exostosis projected from the shaft of the femur above the knee.

DR. MEYER had seen three joints affected by Charcot's disease. In one case the knee was so badly involved that he consented to resect the joint. The patient was afterwards able to walk with a posterior splint, and lived many years. In one of the other cases a foot-joint was involved, and in the third a metacarpo-phalangeal joint.

DR. COLEY said, with regard to the frequency of the disease,

that Dr. Charcot had found it oftener than anybody else,—in 10 per cent. of cases of locomotor ataxia. Dr. Dana had found it in only 5 per cent. In many cases there was a history of syphilis, but this was absent in the present patient. It was an interesting fact that in this case the joint affection began late, ten years after the commencement of the cord-trouble, whereas in the majority of instances it showed itself in the incipient stage.

NEW URINAL FOR CONTINUOUS DRAINAGE AFTER SUPRAPUBIC CYSTOTOMY.

DR. WILLY MEYER presented a man, seventy-two years of age, to whose case he had referred about a month ago, when he presented a stone removed from his bladder by an incision above the symphysis pubis. There was also hypertrophy of the prostate for which he did not think any of the radical operations advisable, and therefore established permanent drainage.

Dr. Meyer had modified the urinal by placing in it a valve to prevent the urine from returning into the catheter when the patient assumed the horizontal posture. He had found by experience that the soft rubber plate over the abdominal opening fitted better than the one made of hard rubber and used by Dr. Bangs. A soft-rubber catheter extended from the bladder through the abdominal wall, the central perforation of the rubber plate was connected with the hard-rubber nozzle of the urinal, as the latter lay against the thigh. Bandages held the plate and urinal in position. The urinal was emptied by removing a screw at its bottom.

KELOTOMY WITH COCAINE ANÆSTHESIA.

DR. JOSEPH D. BRYANT presented a man, seventy-six years of age, who had entered St. Vincent's Hospital, in February, in substantially a state of collapse. The extremities were cold, the pulse very rapid and irregular. Fæcal vomiting, due to strangulated hernia, had existed for five days. Feeling that if ether were given it would be likely, under the circumstances, to cause speedy death, Dr. Bryant injected at once along the line of proposed incision thirty minims of a 2-per-cent. solution of cocaine. Then cutting freely down upon the protrusion, the intestine was returned, while the sac was simply tied, the entire time consumed having been only seven minutes and a half. The house surgeon was then directed to wash the stomach out thoroughly, in order to stop the fæcal vomiting, as this had in rare

cases persisted for some time after relieving the strangulated hernia, and in one or two cases had caused death.

Dr. Bryant said he presented the man simply to show what could be done with a weak solution of cocaine (2 per cent.), and with the stomach-tube in a case of strangulated hernia, which was ready to culminate in fatal collapse.

Dr. RUSHMORE thought that the age of the patient accounted in part for the small quantity of cocaine required to produce anæsthesia. Some time ago he had operated upon a man, aged eighty, who was almost in collapse with stercoraceous vomiting, due to strangulated hernia, and as he feared ether he used cocaine. The patient bore considerable cutting without complaint. Of course, the local anæsthetic effect of cocaine was well known, yet he thought considerable of the indifference to pain could be attributed to the patient's condition and to his great age.

Dr. WILLY MEYER then read the paper of the evening, on

RESECTION OF THE ABDOMINAL WALLS FOR NEO-PLASMS INVOLVING THE SAME.

Dr. BRIDDON said that some years ago he presented to the New York Pathological Society a tumor of the abdominal walls, about six or eight inches in diameter, apparently growing from the internal oblique, which the pathologist pronounced a myxofibroma. It was easily separated from the peritoneum. A hernia resulted into which all the intestines entered, and it was with difficulty that they were retained by bandage.

Dr. COLEY had seen three cases of sarcoma of the abdominal walls. The first was in 1888, in a young woman, on whom the operation suggested by Dr. Meyer was practised, and repeated three times for recurrence, the patient being lost sight of after the fourth operation. He had recently seen a case operated upon by Dr. Richardson, in Boston, August, 1893, the tumor extending to the left from the median line, and not involving the peritoneum. Dr. Richardson, having found the tumor too extensive for removal, referred the patient to Dr. Coley for treatment with the toxins of erysipelas, with the result that the tumor entirely disappeared under two and a half months treatment, and the patient fully recovered her health. The growth had been examined by Dr. Whitney, of the Harvard Medical School, and pronounced sarcoma. The patient was free from recurrence in May, 1894.

DR. BRYANT mentioned a case of sarcoma of the abdominal walls, operated upon by Dr. Phelps at St. Francis's Hospital, in which it was necessary to take away so much of the walls that it was not possible to make complete closure. The patient, however, made a prompt recovery. Any operation which made it necessary to take away a considerable portion of the parietes, or diminished their thickness over a considerable area, and rendered the patient liable to a very annoying hernia, was, he believed, regarded by surgeons generally with aversion, if not with dread. It was desirable, therefore, to bear in mind the fact that the omentum attached itself readily to all portions with which it was brought in contact, a fact which could be utilized by placing it in front of the intestine, and thus preventing this from adhering in an entangled condition to the seat of the wound.

SARCOMA OF THE KIDNEY.

DR. CHARLES MCBURNEY presented a sarcomatous kidney with the history of the case, of which the following is an abstract: T. B., aged ten years, admitted to Roosevelt Hospital April 10, 1894. Family history negative. Until present illness the patient was a strong, healthy boy. For five years had at times complained of scalding micturition. In June last he was struck with a base-ball just below the right costal border. He resumed his play, however. A short time afterwards he began to complain of attacks of severe pain in the right lumbar region, lasting but a few minutes at a time and recurring at intervals of about two weeks. About this time his mother noticed that he was losing flesh. In August he stooped a little to the right, the erect posture causing pain. The jolting during a long ride also caused him great pain. About the 1st of October his mother noticed that his abdomen was much distended. It caused no special distress, and physicians said it was due to gas. Two weeks later his mother noticed a mass below the right costal border, where he had been struck by the ball some months before. He then had an illness which confined him to bed for three weeks. It was characterized by much vomiting, severe pain in the right groin, and rapid wasting. November 12 a New York physician was consulted, and the diagnosis of sarcoma of the kidney was made. An operation was not suggested. He was then treated with plasters by a "cancer and tumor specialist." The tumor went on to increase greatly in size, especially during the last three weeks prior to admission. The pain became continuous, with severe exacerbations; vomiting about once a day; appetite

capricious; confined to house since past week. Nothing abnormal had been noticed about the urine, and it had been pronounced normal by those who examined it. The mother thought the amount was increased. Bowels costive.

On admission the boy was emaciated, cutaneous surface pale, abdomen prominent, being distended a little more on the right side than on the left. A rounded nodular mass was noticeable about the median line just below the umbilicus, about four inches in diameter. Umbilicus depressed; cutaneous veins dilated. Weight before illness was 75 pounds; on admission 67.5 pounds; circumference of chest under arms, 24 inches; at nipple line, 26; at level of eighth rib, 29; at umbilicus, 29.25; at anterior superior spinous process of ilium, 26.5 inches. The edge of the tumor could be felt as an irregular curved border approaching to within three inches of the anterior superior spinous process and the junction of the eighth with the seventh costal cartilage on the *left* side. The lumbar region bulged somewhat. In the right flank the mass felt tense, somewhat elastic, nodular, not moving with respiration. The smaller mass below the umbilicus could be moved with some freedom.

The patient had had no oedema, no characteristic pain of renal colic; urine found negative. Dr. McBurney operated April 14, incision in right lumbar region, beginning at the posterior axillary line and extending anteriorly four or five inches. Finding the tumor was not cystic, the incision was prolonged to the median line to a little below the umbilicus. A few adhesions existed between the surface of the tumor and the abdominal parietes, while to the colon and mesentery the tumor was strongly adherent, and in its separation a little sarcomatous tissue had to be left on the gut. The boy's condition did not permit of intestinal resection. The pedicle was brought into view, the renal vein and artery and the smaller vessels were seized by clamps and the tumor was removed. The previously-arranged plan of operation had included intravenous saline infusion, and during the operation 800 cubic centimetres of hot salt solution were injected into the median basilic vein.

The improvement in the condition of the pulse was rapid and striking, and led Dr. McBurney to again emphasize the importance of being prepared to make infusion in operations of a major character or upon patients in low condition. Iodoform gauze packing was introduced about the clamps. The anterior half of the wound was closed with catgut in layers, the clamps and packing occupying the

posterior half. Hæmorrhage during the operation was slight, and the pulse at its close was very satisfactory. The colon from which mesentery had been torn was drawn so as to present its surface to the packing. The tumor was globular in shape, with a distinct capsule, surface smooth and even, except for two hemispherical projections which were softer than the remainder of the tumor. From the lower end there projected a pedunculated mass, 4 by 3 by 2 inches, with a pedicle 2.5 by 1.5 inches. This was of denser consistency than the rest of the tumor, and it was to this that the colon had been attached. On cross section the tumor was soft, friable, and apparently sarcomatous. At the upper and back part of the tumor was the easily recognized kidney which apparently merged at its lower part into the tumor. The dimensions of the tumor were: vertical circumference at one part 25.5, at another 27 inches; horizontal circumference, 23.5 inches; weight, 9.75 pounds. The pathologist, Dr. Hodenpyl, had reported that the section of the small portion of kidney tissue at the upper end was normal. There was a sharp line of demarcation between the kidney and the tumor at the point of junction. The latter was a myo-chondro-adenocarcinoma.

The patient had made a good recovery from the operation, and the wound was now small and granulating in a healthy manner. Recurrence at a not distant date is to be expected.

In commenting upon the case, Dr. McBurney said the only great difficulty encountered during the operation depended upon the adhesion of the intestine to a portion of the growth which could not have existed more than a month, showing that, had the physician recommended an operation as soon as a diagnosis was made, the tumor could have been removed much more readily and with less danger to life. The packing was partially removed at the end of the second day, and at the same time all the clamps were taken away. Very slight bleeding from one small vessel occurred which was easily controlled by renewed packing. Complete change of packing was made on the sixth day, on the eleventh day two very small fæcal fistulæ formed. The discharges have been entirely controlled by packing.

DR. MCBURNEY added, with regard to the use of clamps, that there were several reasons for employing them in preference to ligatures. They saved time, the ligature might cut through the walls of the large thin vessels, especially of the renal vein, which would necessitate the loss of further time in again securing it; the ligature might break, especially if tied eagerly and rapidly. Another point of value

in this case, and which would be likely to prove very important in similar cases, was the use of intravenous saline infusion, for which preparation had been made before beginning the operation. The infusion was not made because the patient had lost blood, but because he was expected to lose blood, especially the amount contained in the tumor itself which was to be removed. It did not involve loss of time, as the infusion was made by one of the assistants while the operation was going on. He had no doubt but what this precaution saved the patient's life, or that without it the patient would have died.

DR. ABBE thought that some points in the technique of the operation were worthy of special mention. The saving of time by leaving clamps on the vessels instead of ligating them added not a little to the patient's chances of recovery. He also thought Trendelenburg's posture would be found of great value in such cases, as he had used it in three cases of large renal tumors. The two patients shown by himself a few months ago had continued in perfect health. In one he had removed the kidney for sarcoma nearly two years and a half ago, in the other about sixteen months ago. He had operated in a third case four weeks ago, removing a sarcomatous kidney, weighing a pound and a half, without difficulty and with the loss of not more than an ounce of blood. A fourth patient had come under his notice recently, and although the parents had given their consent to an operation, they refused it at the last moment, and took the child home after it had been in the hospital only twenty-four hours. It died within four weeks. The tumor would have weighed twelve or fifteen pounds. Those who made the autopsy said it could have been removed successfully.

RETAINED GALL-STONES WITH CONTRACTED GALL-BLADDER.

DR. ABBE presented some gall-stones which he had recently removed from a woman who had suffered more than five years from attacks of biliary colic. A short time ago two physicians had cut down upon the gall-bladder, had palpated it, and, feeling no stones, had closed the wound without entering the gall-bladder. When Dr. Abbe saw the patient, he was convinced that it was a case of gall-stones, although he was unable to palpate them even after exposing the gall-bladder. On cutting into the atrophied viscus seven small stones were found and removed. He had before had several cases in which small stones could not be felt through the walls of the exposed viscus.

EDITORIAL ARTICLE.

STERN ON THE STATISTICS AND PROGNOSIS OF HERNIOTOMY IN THE INCARCERATED HERNIÆ OF EARLY CHILDHOOD.¹

IN an article published in 1892,² Stern reported two cases of herniotomy in infancy, and commented upon the rarity of strangulation in early life. Since that time he has searched the literature and compiled some interesting statistics upon the subject.

The frequency of uncomplicated rupture in infancy is well known. According to Wernher³ the following distribution was found in herniæ occurring in children under five years of age in 37,873 cases of inguinal rupture :

Boys from 0 to 1 year of age,	4818
Girls " 0 " 1 " "	252
Boys " 1 " 5 years "	1568
Girls " 1 " 5 " "	253

From these figures it will be observed that boys are much more frequently the subjects of hernia than girls.

It is scarcely possible to calculate the frequency of strangulation in children as compared with adults. Wimmer⁴ has attempted to make such a calculation, and has fixed the figure at 1 : 62.

Stern has used only statistics involving children under four years of age. In order to get at the frequency of herniotomies performed

¹ Carl Stern: Beiträge zur Statistik und Prognose der Herniotomie bei incarcerirten Hernien im ersten Kindesalter, Centralblatt für Chirurgie, No. 19, 1894.

² Centralblatt für Chirurgie, No. 2, 1892.

³ Geschichte und Theorie des Mechanismus der Bruchbildung, Langenbeck's Archiv, Bd. XIV, p. 161.

⁴ Inaug. Dissertation, Leipzig, 1868, p. 14.

in childhood he consulted the records of the children's hospitals in Basel, Prag, Breslau, Krakau, Vienna, Frankfurt, Amsterdam, Berne, and Höttingen. In these hospitals were treated 139,000 children during four years preceding 1883. Many surgical operations of every sort were done, but among all this number was not a single child operated upon for strangulated hernia.

Out of 1900 herniotomies performed in various European hospitals were thirteen in children for incarcerated hernia. Stern has also been able to calculate that 108 adults are operated upon for strangulated hernia to every child; but these figures he does not regard as having much accuracy. König states in the fourth edition of his textbook that during his long surgical career, he has had but two opportunities to operate for hernia in the first years of childhood. Nussbaum operated during twenty-five years upon two cases, his material involving 54,000 children. Holmes, of London, during thirteen years has never operated upon such a case; and Buchanan, of Manchester, but once.

The first to make a collection of statistics in this line was Ravoth.¹ He found but 30 authentic cases of herniotomy in children. He was followed by Féré,² who found reports of 56 cases with 52 operations in children under two years of age. Howard Marsh³ collected 47 cases. Knobloch⁴ has collected 87 herniotomies for inguinal hernia, 11 for umbilical hernia, and 1 for femoral hernia. His statistics are, however, not complete. Stern has been able to collect reports of 51 more cases of herniotomy for strangulated inguinal hernia in children under four years of age, with three additional cases of umbilical hernia. With the exception of three, all of the cases occurred within the years 1876 to 1893. Only European literature has been consulted.

In 11 of the 51 inguinal cases the sac contained the cæcum and appendix vermiformis. The ages were distributed as follows:

¹ Deutsche Klinik, 1858.

² Jahrbuch für Kinderheilkunde, 1882.

³ Vol. x, St. Bartholomew's Hospital Reports.

⁴ Inaug. Dissertation, Breslau, 1890.

To the first year belong 34 cases.

" " second " " 13 "
 " " third " " 3 "
 " " fourth " " 1 "

—
 Total, 51

Of the 87 cases figuring in Knobloch's statistics, fifty-nine belonged to the first year of life. All of these were inguinal ruptures. Those cases occurring in children under one year of age are divided according to months as follows:

Month	1	2	3	4	5	6	7	8	9	10	11	12
Stern	8	2	4	6	1	1	1	5	4	0	1	1
Knobloch	8	13	10	3	3	6	2	1	5	3	2	3
	—	—	—	—	—	—	—	—	—	—	—	—
Total	16	15	14	9	4	7	3	6	9	3	3	4

It is very noticeable from these figures that the accident is most frequent during the first month of life. This can be partly due to the fact that herniotomy in such early life is more apt to be reported than that performed later. It is also probable that the diagnosis of the trouble is more difficult in young children, for which reason it more frequently happens that younger children are more frequently found with a long-standing strangulation which demands operation than is the case with older infants. Therefore there are but four cases for the third and fourth years and thirty-seven for the first and second years reported in Stern's table. The observations are not carried beyond these ages for the reason that after this the child becomes sufficiently intelligent to assist in the diagnosis by calling attention to seat of the pain. Furthermore, children over three or four years of age have developed a much greater resisting power than younger infants.

The result of the operation is not given in two cases. Of the 49 remaining cases of inguinal hernia, 11 died,—a mortality of 22.6 per cent. Out of the 87 cases in Knobloch's statistics, 27 died,—a mortality of 31.03 per cent. The total mortality of the 136 is 38 deaths,—27.9 per cent. If the introduction of Listerian practice

is reckoned from 1874, Stern's 49 cases show 9 deaths, or a mortality of 19.5 per cent. for antiseptic operations, against Knobloch's calculation of $33\frac{1}{3}$ per cent. before 1874, and 25 per cent. after 1874. Knobloch has reported in his statistics 28 cases operated upon since 1874 and 59 cases before that time; while of Stern's 51 cases only two were operated upon before 1874. The total mortality for the antiseptic period is 16 out of 75 cases, or 21.3 per cent. These figures Stern regards as being entirely too high. At least one of the seven deaths in Knobloch's statistics must be excluded, because in that death occurred three weeks after the operation from exhaustion. This reduces the mortality to 20 per cent. A number of cases must also be excluded from Stern's table upon the ground that the death was not due to the operation reducing the mortality in the 44 cases operated upon during the antiseptic era to 6:44, or 13.6 per cent.

This mortality of herniotomy in childhood can be compared with interest to the mortality in the same operation upon adults. Pye-Smyth figured the mortality in operations for strangulated hernia in the English hospitals at 43 per cent.¹ Southam found a mortality of 44.7 per cent. among 85 cases operated upon for strangulated hernia.² Reichel reported a mortality of 25 per cent. among uncomplicated herniotomies,³ against Schmidt's figure of 27.4 per cent.⁴ Hagedorn had a mortality of 13 per cent. among 154 uncomplicated herniotomies for strangulation. Riedel out of 70 similar cases lost but 2.8 per cent. Schede had but 7 deaths out of 115 inguinal and femoral herniotomies, or 6 per cent. In Greifswald in 1888 the mortality was 22.7 per cent. Nussbaum had 84 operations in 1885-89, with 30 deaths, 35.8 per cent.⁵ König's mortality in uncomplicated cases reached 12.7 per cent.⁶ Out of a total of 733 uncomplicated herniotomies performed upon adults for incarcerated rupture during

¹ Brit. Med. Journal, 1855, October 31.

² Lancet, November 28, 1891.

³ Die Lehre von der Brucheinklemmung, 1886.

⁴ XII Kongress der deutsche Chirurgen.

⁵ Annalen d. Münchener Krankenhauser.

⁶ Gräser: Die Unterleibsbrüche, Wiesbaden, 1890.

the antiseptic epoch, the mortality is 18.9 per cent. When this is compared with that of childhood, which is 13.6 per cent., it becomes evident that herniotomy in children is a less dangerous operation than in adults. This is not to be wondered at when it is considered how often the operation is performed upon old and decrepit individuals, in whom, entirely independent of the operation itself, the cardiac and pulmonary weaknesses render any operation especially hazardous. It is not so much the local effect of the operation as the general effect upon the whole organism.

In the fourteen umbilical hernias the mortality reached 50 per cent. When only the cases operated upon since 1874 are counted, and the deaths which followed immediately upon the operation, the percentage sinks to 36.3, or four deaths among eleven cases.

Stern has observed that one of the most common symptoms in children is the retention of the urine.

JAMES P. WARBASSE.

REVIEWS OF BOOKS.

A TEXT-BOOK OF THE DISEASES OF WOMEN. By HENRY J. GARRIGUES, A.M., M.D., containing 310 engravings and colored plates. W. B. Saunders: Philadelphia, 1894.

The purpose of this work as stated by the author is to present a full but concise exposition of the nature and treatment of the diseases peculiar to women. To provide for the busy practitioner a succinct account of the present state of gynæcology, and to supplement the training of that large class of physicians who have not had the advantage of a hospital service.

The author divides the book into two parts,—a general and special division. The first division treats of anatomy, physiology, and treatment in general. The second treats of the diseases peculiar to the special parts of the female genitalia. The chapter on the anatomy of the female pelvic organs cannot be too highly commended. It is a thorough, comprehensive, and detailed exposition, an equal of which is not to be found even in text-books devoted exclusively to that branch.

In the succeeding chapters the author gives his readers a hasty and at times a superficial glance of the subjects discussed. The feeling that one is being drawn along at too rapid a pace is ever present. The desire to stop and question the author's statements, the reasons for which the reader looks in vain, is constant.

The book is especially rich in the subject of treatment. It is here that the author shows a wide knowledge of therapeutics, and a commendable wealth of resource. The chapter on treatment in general will be found full of valuable suggestions. The fact that the author is an original, as well as an earnest worker, is attested by the

numerous instruments and devices which have emanated from him, and to which the reader is introduced in this chapter.

The author's descriptions of operations are particularly lucid, while his use of the diagram in illustrating the details of suturing and the coaptation of parts is exceedingly satisfactory.

The admonition to avoid the risk of repairing the cervix and perineum at the same sitting may appeal with some force to the cautious gynæcologist,—to the skilful surgeon it is ludicrous.

The reader nowhere feels that the author has obtruded his own personality into the text. A choice of several procedures is always given, but the reader must make the selection.

The weight of the author's experience never moves the balance in favor of one method rather than another. A concise opinion of the value of the different procedures; some reasons why one is to be preferred to another; a final summing up, and the deductions of a single principle of treatment would give the work an air of authority which is wanting, and impregnate it with an individuality which the reader misses.

It is this that we expect from one who has so long and prominently figured as a practical educator. It is the absence of this that makes the disappointment greater.

That the author has succeeded in realizing his purpose is true to a limited extent. To the scholar who demands an *ex-cathedra* exposition of the present status of gynæcology this work will be disappointing. The absence of authority which marks its statements, and its failure to elucidate and emphasize the fundamental principles, diminish its value to him.

To the busy practitioner seeking for suggestions, and desiring to enlarge his store of resources, this work is especially commended. He will find that a perusal of its pages will amply repay; from it he will glean many and valuable hints, a large number of which are original with the author.

WILLIAM FRANCIS CAMPBELL.

ERFAHRUNGEN ÜBER NIERENCHIRURGIE. VON PROFESSOR DR. JAMES ISRAEL, dirigirender Arzt am Krankenhause der jüdischen Gemeinde zu Berlin. Berlin, 1894. Verlag von August Hirschwald. (Experiences in the Surgery of the Kidneys.)

The work is based upon eighty-one operations which the author has performed upon the kidneys during the eleven years from 1882 to 1893. The material has been thoroughly studied, and as the work comprises about every operation upon that organ, it forms quite an elaborate treatise upon the surgery of the kidney, based wholly upon cases coming under the author's own observation and treatment.

The following table gives an idea of the operations performed :

Nature of Operation.	Number of Operations.	Mortality.
Nephrectomy	37	7 = 18.9 per cent.
Nephrotomy	12	2 = 16.6 "
Nephrolithotomy (one of which was double) . .	8	2 = 25 "
Isolating an entire ureter in connection with pyelotomy	1	0 = 0 "
Exploratory incision of the kidney	4	1 = 25 "
Opening the capsule of the kidney	1	0 = 0 "
Aspiration for drainage	2	0 = 0 "
Exploratory isolation of the kidney from its bed	3	0 = 0 "
Operative closure of a fistula of the pelvis . . .	1	0 = 0 "
Incision of paranephritic abscess	8	0 = 0 "
	81	12 = 14.8 per cent.

These cases are made the basis of some very valuable clinical, pathologico-anatomical, and statistical observations.

JAMES P. WARBASSE.

TO CONTRIBUTORS AND SUBSCRIBERS.

All Contributions for Publication, Books for Review and Exchanges should be sent to the Editorial Office, 386 Grand Avenue, Brooklyn, N. Y.

Remittances for Subscriptions and Advertising and all business communications should be addressed to the

UNIVERSITY OF PENNSYLVANIA PRESS,
716 Filbert Street,
Philadelphia, Pa.

EXPERIMENTAL RESEARCHES IN INFECTIVE EMBRYONAL PATHOLOGY.¹

By ANGELO MAFFUCCI, M.D.,

OF PISA,

PROFESSOR OF PATHOLOGICAL ANATOMY IN THE UNIVERSITY OF PISA.

TWO facts have induced me to make these researches: First, I wished to know if an embryonal tissue in contact with a certain virus has the same strength of resistance as the tissue of an adult. We can get a clear idea of all these relations only when we shall have studied also all the relations in the embryonal life. Therefore, after the comparative studies of Metschnikoff, I believe that it will be necessary to try, also, the study of the infective pathology of the embryo. The second reason for making these studies was the fact that all who have occupied themselves in the study of infective embryonal pathology have either not found any micro-organism in the tissues of the embryo, while they were present in the tissue of the mother, or they have found those micro-organisms not very numerous. Therefore most inquirers have believed that the last fact could be the effect of the difficulty with which the micro-organisms would pass from the mother to the foetus. But we must pay regard to the power of the organisms to resist the microbes. And about this fact we possess only the indirect observations of Baumgarten.

The opinion of those who believe that the placenta is a filter, which may be penetrated if it is altered, does not answer the other question, What becomes of the micro-organisms which pass through the placenta and come in contact with the tissues of the embryo?

All inquirers admit the presence of germs in the sperma of

¹ From the Institute of Pathological Anatomy of the Royal University of Pisa (Italy).

animals taken ill by certain infections, as tuberculosis. Notwithstanding one does not admit the possibility that the tuberculous father can generate a tuberculous child, it is taken for granted that a syphilitic father can generate a syphilitic child. Why shall we make such a difference for these two infections? While there have not been found tubercles or bacilli in a fœtus generated by a tuberculous father, specific lesions have been found in the fœti of syphilitic parents. And here we can ask if the egg does not receive the bacilli with the spermatozoid, or are the tissues of the embryo resisting to the development of the bacillus? Therefore I chose the eggs of the hen, which I could study with great facility in the different brood periods. I have inoculated different microbes into the eggs of the hen before placing them in the brood-oven, and at different periods of the brood period I have inoculated also the albumen which encloses the embryo. The albumen which has been fecundated and bred is very favorable to the development of a certain series of pathogenic micro-organisms, but the albumen which has not been bred does not have this power.

Here I may add that the reception of the microbes from the albumen by the embryo does not happen by the vascular layer, but by the allantoïd bladder, and therefore the inoculated microbes penetrate to the tissue of the embryo only by the tenth day. The microbes I inoculated were those of anthrax bacilli and spores of the cholera of fowls, of the pneumococcus of Friedländer, of the fowl tuberculosis, of the tuberculosis of the mammalia, and the toxic products of the fowl tuberculosis and that of the mammalia.

The following method I have chosen to prove the presence and the phases of the above-named microbes: I made the histological examination of the albumen at different brood periods, and the histological examination of the different tissues of the embryo (without the bile and the contents of the stomach). And then I made cultures from all these parts respectively, and inoculated animals with all the matters, which I examined.

Of the organs of the embryo the most interesting was the liver, which one can comprehend, since it is the first entrance

from the albumen into the embryo. At the same time I studied the infected embryos, which had been brooded and kept in life for a long time, that I might observe in what manner the microbes absorbed in the embryonal life would behave in the life out of the egg. The following results I have obtained :

(1) The albumen, fecundated and brooded, taken from the eggs in different brood periods, is a favorable medium for the growth of the above-named micro-organisms. But the same fecundated and brooded albumen does not induce the growth of these microbes in the living embryo.

(2) During the life of the embryo, the microbes, which are present in its tissues, do not multiply.

(3) The tissues of the living embryo can contain many microbes which are capable of killing the control animal, whilst the embryo does not suffer from the presence of those microbes.

(4) The microbes can be destroyed or attenuated in the tissues of the embryo, but not in the surrounding albumen.

(5) Some embryos can die under the action of the pathogenic microbes of the adult fowl.

(6) The embryos can be brooded, and some of them die after a few days by infection; the others remain alive, because the microbes are destroyed completely; but generally they are marasmic ones.

(7) The infection can develop much time after brooding as a chronic infection (tuberculosis of the fowl).

(8) The tuberculosis of the fowl appears first in the liver, where it can heal, and later in the lungs and spleen.

(9) When the embryo has destroyed the bacillus of the fowl tuberculosis, it is born marasmic, and with this form after a long time can die without tuberculosis in the organs.

(10) The same effect of marasmus one can obtain by inoculating into the eggs dead bacilli of the fowl tuberculosis.

(11) The embryo, having destroyed the bacillus of the fowl tuberculosis and been born marasmic, can grow very well.

(12) The destruction of the virus by the embryo does not make it refractory against the same infection when it was inoculated a long time after hatching (fowl cholera).

(13) If the embryo does not destroy the bacillus of the tuberculosis of the mammalia, this is not transformed into that of the fowls.

(14) The embryos which have been inoculated with the pathogenic microbes of the adult fowl resist the infection until the microbes have entered in great quantity into the tissues (anthrax, borbone, pneumobacillus).

(15) The liver is an organ where the microbes are destroyed, but often the virus is already attenuated (cholera of the fowl).

(16) Whilst all these changes happen in the tissue of the embryo, the rest of the microbes remaining in the albumen maintain their pathogenic power. Therefore the animals inoculated with albumen die, but those which are inoculated with the organs of the embryo and with the cultures of these organs do not die.

(17) The attenuation of the virus (cholera of the fowl) does not happen within a fortnight during the brooding time. On the contrary, the virus is virulent in the albumen and in the tissues of the embryo. The attenuation appears on the eighteenth day of the brooding time.

(18) The attenuated virus remains for a few days after the birth in the pullet, but disappears with the growth.

Having made the experiments with the embryos, I wished to study the manner of reaction in an embryo of a mammalia, and I chose the embryo of the rabbit and the virus of tuberculosis.

The following method has been used:

I inoculated buck conies by the jugular vein with the tuberculosis of the mammalia, and I examined their semen from twenty-four hours up to three months thereafter.

It was difficult to detect the bacillus of tuberculosis in the semen during the first days. On the contrary, I found from the twenty-fifth day until three months a great number of bacilli. I inoculated with the semen sea-hogs, which became tubercular.

Other buck conies, in whom I inoculated the same dose of tuberculosis in the jugular vein, have been put in contact with does which became pregnant. The young ones I maintained in part in life, other ones I took out of the uterus of the mother and inoculated their organs into sea-hogs.

Only two sea-hogs inoculated with organs of a foetus of a tubercular father became tubercular.

Of the rabbits, some died spontaneously and others have been killed. These animals before two months after birth did not present tubercular lesions. From two months to a year, one could observe in the liver nodules which had the classical structure of tubercle, cheesy substance in the centre, epithelioid and giant-cells, and lymphoid infiltration on the periphery.

The most scrupulous researches, made after the method of Ehrlich, never have shown tubercle bacilli in these young forms of tubercle. Inoculating such nodules into sea-hogs, there was no effect to be seen, or they died by marasmus, but never by tuberculosis. Some of the mothers of these rabbits (of tubercular paternity) died tubercular by vaginitis tubercularis, and others by tuberculosis of the abdominal organs without vaginitis tubercularis. These mothers have become tubercular a long time after the delivery, and their young have been separated from them as soon as they could eat.

Another series of researches has been made with pregnant does, into whom has been inoculated in the jugular vein, from the fifteenth to the twenty-fifth day of the pregnancy, a culture of tuberculosis. Many of the does have been killed from one hour after the inoculation until fifteen days, and the organs of these foeti have been taken with the greatest circumspection, and the embryos have been placed for a long time in sublimate, and then were washed with alcohol and cut by sterilized instruments, and all their organs and the contents of the stomach have been inoculated into a series of sea-hogs. But from all these sea-hogs only three became tubercular, and just those which were inoculated with organs of foeti killed in the first forty-eight hours after the inoculation applied to the mother. All the other sea-hogs either died by marasmus, as if they had been inoculated with a culture of sterilized tuberculosis, or they did not feel anything.

All the rabbits born of mothers treated in that manner (by the inoculation of tuberculosis into the jugular vein) have shown nodules of tubercular structure in the liver, but never before the fourth month after the birth. These nodules presented at the

first time central, cheesy masses, epithelioid and giant-cells around the cheesy mass, and lymphoid infiltration on the periphery. Inoculating these nodules into sea-hogs, these never became tubercular, but some of them died by marasmus, and the same nodules examined by the method of Ehrlich never showed the presence of bacilli.

In a few cases I could still find nodules in the lungs with the same structure, but without bacilli. The nodules of the liver do not present a progressive but a regressive phase, so that some young of the same mother, killed after four or five months, present the most typical forms of the structure of the tubercle, while those killed after a year will show only the tuberculosis in the cicatrizing phase with little cheesy substance and with some giant-cells. The sea-hogs inoculated with these nodules did not become tubercular, but died of marked marasmus.

To remove any doubt that the nodules shown in the young of the tubercular mothers had been produced by nursing, I inoculated into the does, two days after the delivery, a strong dose of tuberculosis in the jugular vein, but those does never have borne young with tuberculosis in the liver and in the lungs.

Therefore, for the embryo of the mammalia (rabbit) I can give thus far the following conclusions:

(1) The *fœtuses* of mothers grown tubercular during the pregnancy can contain the bacillus after four hours from the inoculation in the jugular vein of the mother.

(2) In the placenta there is no development of tuberculosis after fifteen days from the moment that the bacillus is found in the blood of the mother; also it is difficult to find the bacilli in the vessels of the placenta.

(3) The organs of the *fœtuses* of mothers grown tubercular can render tubercular sea-hogs in the first forty-eight hours after the inoculation, because they contain living, though few bacilli.

(4) The great mass of sea-hogs not rendered tubercular (inoculated with the organs of a *fœtus*) died by marasmus as if they had been inoculated with dead bacilli.

(5) The rabbits born from tubercular mothers do not present tubercles until the sixth month after their birth, but after this

period they can contain tubercles in the liver and in the lungs, but without bacilli visible to us.

(6) In an exceptional case I could find that the organs of a foetus from a tubercular father, inoculated after its birth into a sea-hog, made it tubercular.

(7) The young from a tubercular father present only three months after the birth tubercles in the organs, but without bacilli visible to us.

REMARKS.

How may be explained these facts found in the mammalia? If the lesions found by me in the liver of the rabbits coming from tubercular father and mother may be of bacillar origin, I believe that the history of the above-named facts in the fowl embryo can give us this interpretation; that the virus can be destroyed or attenuated by the embryonal powers; therefore, the tubercular bacilli, brought into contact with the embryonal tissues of the mammalia, have been paralyzed or killed by these, and where the bacilli remained they caused a phlogosis with all the characters of the tubercle, as Prudden has observed in sterilized cultures of bacilli. Another fact supports my idea: the tubercles generated by dead bacilli undergo an involutive fibrous, not progressive phase.

The most destruction of the virus has been observed in the liver of the fowl embryo. Therefore, I can affirm that the liver is in embryonal life a great protector against the infections, being capable of destroying inoculated microbes, even the spores of anthrax.

GENERAL CONCLUSIONS.

During its life the embryo does not permit the growth of pathogenic microbes in its tissues (except only in an exceptional case), but it can destroy them, attenuate or accumulate them, and develop them later in the life out of the egg.

ON THE TREATMENT OF VESICO-VAGINAL
FISTULA BY OPERATION FROM WITHIN
THE BLADDER.

By C. J. BOND, F.R.C.S.,

OF LEICESTER,

SURGEON TO THE LEICESTER INFIRMARY.

IN November, 1890, a paper was reported in the *Lancet*, by the late Mr. McGill, of Leeds, in which he advocated the closure of bad vesico-vaginal fistulæ by operating within the bladder through a suprapubic opening, and in which two successful cases were also recorded. Trendelenburg also stated at the Leeds meeting of the British Medical Association, in August, 1889, that he had successfully adopted this route in one case.

A patient happened to be in the Leicester Infirmary with vesical fistula just before the publication of Mr. McGill's paper, and the question of opening the bladder and closing the fistula from within presented itself to me; however, an attempt was first made to cure it by the vaginal route, and although this was only partially successful, the patient left the hospital and did not return for three years; on this occasion the fistula was closed by the suprapubic operation, and another successful case has recently occurred.

First as regards the frequency of these cases. It is, I think, probable that vesico-vaginal fistula following labor is a less frequent affection now than formerly. It is essentially a disease of the poor, and owing, probably, to increased knowledge and skill on the part of medical men, women are not now left to struggle through a protracted third stage of labor, and so are relieved from the extensive sloughing and pressure effects which formerly occurred.

There will, however, doubtless, always be a few cases of this most distressing malady, and such cases are, and have been, the subjects of probably more unsuccessful surgical operations than, perhaps, the sufferers from any other surgical affection; this being so, any improvement in the manner of operation, which leads to a more certain closure, is a matter of importance.

As regards the kind of cases most suitable for treatment by the new route, those are especially so in which extensive cicatricial contraction has occurred; in such cases the vaginal roof is often tightly stretched across the pelvis, and the neck of the uterus cannot be drawn down; if, under these conditions, the fistula be extensive and situated high up near the uterus, considerable advantage is obtained by choosing the new method.

As regards the operation itself. The bladder may first be injected, the finger of an assistant meanwhile blocking the fistulous opening; if this is impossible, it may be opened by a vertical incision above the pubes on a sound, the peritoneum being carefully drawn out of the way.

Mr. McGill adopted in both his cases a transverse incision through the skin and recti, and also into the bladder; but I have found that the vertical incision gives plenty of room and the recti can be partially divided transversely, if necessary, and then drawn outward. The walls of the bladder are now held apart and the cavity opened out by three long, curved metal retractors, and by these means and the upward pressure of the bladder by the assistant's finger in the vagina the fistula and field of operation can be brought well within reach, the thin cicatricial junction of the two mucous membranes is now incised all round and two flaps of vesical mucous membrane are raised, one on either side the rent, with their edges turned inward towards the bladder, and are sutured with catgut on a doubly-curved needle such as is used for cleft-palate suture; at this stage also the rectangular knives and long forceps are also useful, and care must be taken at the angles to extend the separation of the mucous membrane beyond the actual limits of the fistula.

A few silver-wire sutures are afterwards used to draw the edges of the vaginal mucous membrane together, these having

been already freshened on their vesical surface by the operation within the bladder.

It is very important in the after-treatment to avoid the occurrence of cystitis, and I have found continuous irrigation of the bladder, day and night, with warm boracic solution very useful. It is carried out as follows :

After the closure of the fistula, a piece of india-rubber tubing, or a large Jacques catheter, is passed through the urethra and drawn out above through the suprapubic wound, and to the upper end of this is attached the nozzle of the irrigator tube, the tube within the bladder has a few lateral holes, cut in that part of its course which lies within the cavity of the viscus, and these allow of a free current of lotion both inward and outward and the cavity can be distended and flushed at will by compressing the tube beyond the urethra; the rate of flow can be easily regulated by pressure-clamps and the irrigator kept constantly warm by a cotton-wool jacket. This irrigation can be continued as long as necessary, and the tube gradually dispensed with, by first drawing it within the bladder and allowing the suprapubic opening to close, and then removing it entirely.

The portion of tubing projecting from the urethra should be sufficiently long to reach a receptacle in order to avoid discomfort.

In addition, I have found this continuous irrigation very useful in other cases of suprapubic cystotomy, in which the bladder has been drained by a tube passed through the membranous urethra,¹ the continuous current of the acid lotion preventing the deposition of phosphates in and around the wound.

There are, I think, several reasons why the suprapubic method offers a surer means of closing the fistulous opening in bad cases. First, because the vesical flaps when raised and turned inward have their surfaces opposed to the direction of the current of urine flowing through the fistula, and are thus more tightly closed by its pressure, unlike the flaps formed by vaginal mucous membrane; the vesical flap is, in fact, the valu-

¹ See paper in *Lancet*, August 10, 1889.

able agent in closing the opening, and it is in proportion to the care taken to thoroughly free and separate these that success depends, even in operating through the vagina. Moreover, in most cases of extensive loss of substance, the vesical mucous membrane has grown over the edge of the fistula, projecting into the vagina, and is more voluminous than the vaginal membrane.

Secondly, the suprapubic opening, especially where combined with the urethral drain and constant irrigation, insures complete drainage,—that is, the absence of all tension within the bladder. This is a most important factor, and is in itself sufficient in some cases to bring about cure without further operation.

Such an opening is a far more effectual form of drainage than the introduction of a self-retaining catheter only, which is almost sure to induce cystitis.

In conclusion, I would suggest that further trial should be given to the suprapubic route, in the bad cases of a malady which is most distressing to the patient, and often a source of anxiety to the surgeon.

The following cases were operated on by this method:

M. P., a multipara, aged forty, has a small fistula high up, of many years' duration.

One previous attempt at closure by vaginal operation with partial success. November, 1890.

Closed at one operation by the suprapubic method. May, 1893.

S. M., multipara, aged thirty-eight, has two fistulæ, one very extensive and high up, and one smaller opening communicating with the urethra at its vesical end.

One unsuccessful attempt by the vaginal route, the bladder was then opened, and the fistula closed from within, this was almost entirely successful, a small sinus just admitting a probe remaining, which was closed from below. December, 1893.

The urethral fistula was also closed from below, while the bladder was still drained by the suprapubic opening.

URO-GENITAL TUBERCULOSIS IN THE MALE.¹

By MILES F. PORTER, M.D.,

OF FORT WAYNE,

PROFESSOR OF SURGERY AND GYNÆCOLOGY IN THE FORT WAYNE COLLEGE
OF MEDICINE.

TO serve as a text, and for the further reason that one of the features it presents is of sufficient rarity to warrant its being placed on record, I desire to report the following case:

George H., aged fifty-three years; twice married; father of seven children (the youngest twelve months old), was first seen by me on April 19, 1894, on account of a severe hæmoptysis. Family history negative. No history of syphilis. His first wife died of dropsy. His present wife is in good health. Thirty years ago he had pain in the chest with cough and expectoration. Sixteen or eighteen months ago his testicles began to swell and were very painful,—the left one being the worse. Twelve months ago hæmaturia, dysuria, and frequent micturition commenced, and are growing worse in severity. He urinates more frequently at nights. The hæmaturia is not copious, and the history shows that the blood comes from the urethra. He has chills, night-sweats, fever, cough, expectoration, and has lost much flesh and strength. Examination of lungs shows dulness, absence of vesicular murmur, increased vocal fremitus, and bronchial breathing over upper left lobe. The *meatus urinarius* is patulous, admitting the end of my index finger, eroded, and discharging a watery pus. The urethra is indurated and feels like a whip-cord along its whole course. The epididymes, vesiculæ, and prostate are enlarged, hard, nodular, and somewhat tender. The urethral discharge, under the microscope, shows pus-cells and tubercle bacilli. The urine is acid; specific gravity, 1014; albumen, together with blood, pus, and bladder epithelia are present.

¹ Read to the Northwestern Ohio Medical Association, June 29, 1894, at Van Wert, Ohio.

We do not desire, in this paper, to speak of the acute miliary form of tuberculosis, but of that more common form represented by the case reported, which is typically chronic, and is characterized by diffuse inflammation involving a greater or less portion of a given organ with a tendency to caseation of the inflammatory products.

How the infection reaches the genitalia, the point at which the infection begins, and whether or not the disease is always secondary, are questions of prime importance.

In the case reported, the history makes it clear, I think, that the uro-genital tuberculosis was secondary to a pulmonary tuberculosis, and that therefore the infection was, in all probability, carried from the latter to the former by the blood-stream. Primary local infection, inheritance, extension by contiguity and *via* the lymphatics, the other possible modes of infection, may be ruled out.

Cornet¹ has produced tubercular lesions of the penis in dogs by inoculation of abraded surfaces. Jonin² saw nine cases of tubercular endometritis due to sexual contact with men suffering with genital tuberculosis, and says that Cornil and Chautemesse have produced the disease artificially in the vaginæ of rabbits. Barbier³ also believes that a woman may be infected by a tuberculous man, during coitus, through the semen. I have been able to find mention of but two cases of direct local infection in males,⁴ and in both of these cases the infection was supposed to have been carried to the prostate by unclean catheters. If direct local infection were common, tubercular ulcers of the foreskin, glans, and other exposed portions should be common, whereas they are extremely rare. Bryson⁵ says that competent observers are agreed that the prostatic-vesical region is, by many times, the most frequently affected of all the genito-urinary system. Finckh⁶

¹ Senn's Principles of Surgery, p. 537.

² Loc. cit., p. 538.

³ Loc. cit., p. 537.

⁴ Genito-Urinary Diseases, Syphilology, and Dermatology. Morrow, Vol. I, p. 842.

⁵ Loc. cit., Vol. I, p. 847.

⁶ ANNALS OF SURGERY, Vol. VI, p. 54.

and Senn¹ name the epididymis as the most frequent starting-point, the testicles, seminal vesicles, and prostate coming next in the order named.

Professor Bardenheuer² also says that tuberculosis of the epididymis is a primary disease. Gerster, as quoted by Mynter,³ says that "tubercular epididymitis and orchitis is a common sequel of urethral tuberculosis, and is then generally double." This observation I think to be rather unusual. I have found no similar opinion expressed in quite an extensive research, while Senn, Bull, Richardson, Wiest, and Kelly,⁴ each write me that they have never seen a case of tubercular urethritis. Lustgarten⁵ says it "may in rare instances be a partial symptom of a more or less generalized uro-genital tuberculosis." Bryson⁶ says, tuberculosis of the urethra is doubtless very rare, as a primary infection, either of the body or of the uro-genital cycle. Ziegler,⁷ in his last edition, does not mention urethral tuberculosis, and Orth gives but a short account of it, and says it is very rare in both men and women. Kraske⁸ has observed one case of ulceration of the urethra in connection with general genito-urinary and pulmonary tuberculosis, and one case of ulceration of the glans penis, in which the infiltration extended deep into its structure. In this case there were no signs of pulmonary tuberculosis. Bryson⁹ reports a case of tubercular ulcer of the floor of the urethra, one and a half inches behind the *meatus externus*, occurring secondary to old tubercular foci in the lungs and post-cervical lymphatics.

Poncet¹⁰ reported to the French Congress for Study of Tu-

¹ Senn's Principles of Surgery, p. 541.

² ANNALS OF SURGERY, Vol. VII, p. 54.

³ ANNALS OF SURGERY, Vol. XVII, p. 433.

⁴ Through Dr. T. S. Cullin, by letter.

⁵ System of Genito-Urinary Diseases, Syphilology, and Dermatology. Morrow, Vol. I, p. 143.

⁶ Loc. cit., p. 871.

⁷ Letter to author from Dr. T. S. Cullin, of Johns Hopkins Hospital.

⁸ Senn's Principles of Surgery, p. 541.

⁹ Morrow's Genito-Urinary Diseases, pp. 842, 843.

¹⁰ Annual of the Universal Medical Sciences, Vol. III, F. 10, 1894.

berculosis an article on tuberculosis having its origin in the penis. Three varieties are mentioned,—

- (1) Balano-preputial tuberculosis ;
- (2) Tuberculosis of the mucous membrane (this variety usually showing itself in the deep urethra) ; and,
- (3) A tuberculosis of the urethra which consists of fungous masses involving the peri-urethral tissues, thereby allowing the urine to infiltrate the penile structures.

I may also state that none of my colleagues have ever seen a case of tubercular urethritis, either existing alone or as a part of a general uro-genital tuberculosis.

Authorities are pretty generally agreed that the kidneys may be the first organs affected in the uro-genital tract, and that the affection may descend from thence to the prostate, bladder, etc., either by way of the blood- or lymph-channels, or, though rarely, through the urinary stream. Bryson¹ says, he knows of no recorded case proving this latter mode of infection. Indirect local infection,—*i.e.*, infection of the bladder, prostate, vesiculæ, etc.,—through a healthy urethra, must be regarded as highly improbable, if not impossible, as Guyon² and other experimenters have shown that pathogenic bacteria do not thrive in healthy urine ; besides the tendency of micturition would be to wash them out through the urethra before they would have time to gain a foothold in either the bladder or urethra.

Bryson³ says his observation "leads to the opinion that extension to the uro-genital tract from the peritoneum is of much more frequent occurrence than is generally believed by surgeons." He also accepts Baumgarten's view that it may be congenital. In view of the numerous clinical observations substantiating the theory of inheritance, and the fact that the bacillus tuberculosis has been found by several observers in the semen,⁴ the possibility of direct transmission from father to child no longer admits of doubt.

¹ Loc. cit., p. 844.

² Annual of the Universal Medical Sciences, Vol. III, E. 23, 1890.

³ Loc. cit., p. 846.

⁴ The bacillus of tuberculosis has been found in the semen of men whose genital organs were not tubercular.—American Text-Book of Surgery, p. 75.

From the foregoing we learn that while there is considerable difference of opinion as to the most frequent starting-point of uro-genital tuberculosis, there is no question but that it is either the prostatic-vesical region or the epididymis. While the authorities do not agree with Bryson's opinion on this point, as given above, yet I am inclined to give it a great deal of weight, inasmuch as he is the latest authority of which I have knowledge, and would surely not make such a statement without having adequate proof of its correctness. No matter which of the two most generally accepted views be taken as correct, the deduction will be the same, —viz., that the infection must in these cases be carried by the blood- or lymph-streams, except in those cases which are secondary to tubercular peritonitis.

It does not necessarily follow, however, that in all these cases there is a tubercular process elsewhere in the body; for nothing is more fully proved than the fact that pathogenic germs (the tubercle bacilli included) may gain entrance to the body at one point and be carried in the blood- and lymph-channels to points far distant before setting up their characteristic reactions. That this occurs in the disease in question is accounted for by the small size and tortuosity of the vessels of the epididymis; the large amount of blood normally supplied to the uro-genital apparatus; its dependent position; the frequent and marked changes which occur in the blood-supply to the parts as a result of sexual excitement, and which are peculiarly calculated to invite attack from septic organisms. The fact that uro-genital tuberculosis is pre-eminently a disease of early adult life emphasizes the importance of this last-mentioned etiological factor, as does the fact, also, of the relatively late appearance of uro-genital tuberculosis as compared with other forms. The latter also goes to prove that the disease in question is usually secondary. Again, we should not lose sight of the fact that a focus of tubercle, say in the lung, may give rise to uro-genital tuberculosis, while the focus itself is well on the road to cure. We are warranted in concluding this part of our paper as follows:

(1) Uro-genital tuberculosis most frequently commences in the epididymis or in the prostatic-vesical region.

(2) It is usually secondary to a focus elsewhere in the body, although it may in rare instances be primary.

(3) Being secondary, it may be the only point of activity of the disease, and therefore the only disease-process, the removal or cure of which is necessary to the recovery of the patient.

(4) Primary local infection occurs very rarely.

(5) Secondary infection occurs by the way of the hæmatic or lymphatic channels, or from neighboring organs or tissues in the order of frequency named.¹

(6) Hereditary infection occurs with greater frequency than is usually believed.

(7) Tuberculosis of the urethra, except as a part of a more or less general uro-genital tuberculosis, is exceedingly rare, and in such cases the deeper urethra only is usually involved, the anterior portion very seldom.

(8) Primary uro-genital infection by way of the blood- and lymph-channels is not impossible, though it is rare.

Views as to treatment vary to correspond to the various views indicated above as to the point of origin, mode of infection, the local or general character of the trouble, etc. Again, the treatment even among those of the same opinion must vary to meet the demands created in individual cases by the location and extent of the trouble.

Where we have reason for believing that the disease is localized in the testicle or epididymis, castration is the only treatment considered worthy of consideration by Finckh,² Senn,³ H. Kolpik,⁴ and others, while Verneuil thinks the removal of one testicle gives an impetus to the malady in other organs, and, therefore, extirpates in advanced cases only, and uses interstitial cauterization in cases of moderate severity. Neither Finckh nor Simmonds⁵ think that disease of both testicles proves intrapelvic infection, and would not, therefore, refuse double castration.

¹ Morrow, *Genito-Urinary Diseases*, p. 848.

² *ANNALS OF SURGERY*, Vol. VI, p. 54.

³ *Principles of Surgery*, p. 543.

⁴ *Annual of Universal Medical Sciences*, E. 4, 1890.

⁵ *ANNALS OF SURGERY*, Vol. VI, p. 55.

Finckh found the *vas deferens* healthy in five out of eight cases, out of double castration, and Simmonds¹ reports three out of five. Even where there is intrapelvic infection and complete removal of infected parts is impossible, both these authorities advocate castration. Finckh² reports a case of this kind which lived twenty-three years after double castration. Removal of the epididymis is recommended by Mynter³ and Bardenheuer⁴ in cases of tuberculosis of this organ, on the general ground that when done early it offers equally as good chances for complete cure as castration, and does not unsex the patient.

Injections of iodoform, zinc chloride, the use of the cautery, and the curette all have their advocates, and in cases where the location of the trouble precludes complete resection, they are oftentimes the best means of treatment, although Mynter (*loc. cit.*) says he never succeeded in curing a single case of epididymitis by these means. Where feasible, complete removal of the diseased organ, except in cases of tuberculosis of the kidney, is preferred by the majority of those qualified to speak with authority.

In cases of kidney tuberculosis incision, drainage, curettement, splitting the capsule, and resection in properly-selected cases are to be preferred to complete removal. All instrumentation, washings of the middle and lower urinary tracts should be carefully avoided in cases of renal tuberculosis; for it is well known that symptoms of vesical irritation often arise early in these cases while the tuberculosis is yet confined to the kidneys. Under these circumstances catheterization, injections, etc., may cause an infection of the lower urinary tract which, but for such interference, would not occur. In case the seminal vesicles are infected, either alone or in connection with the epididymis, they should be removed according to Ullman.⁵ It is probably true that the vesicles are affected in all cases of uro-genital tuberculosis where they can be palpated, for Martin, Bangs, and Hayden,

¹ ANNALS OF SURGERY, Vol. VI, p. 55.

² *Loc. cit.*

³ ANNALS OF SURGERY, Vol. XVII, p. 435.

⁴ ANNALS OF SURGERY, Vol. VII, p. 477.

⁵ Senn's Principles of Surgery, p. 544.

in the discussion of Dr. Taylor's¹ paper on "Seminal Vesiculitis," all agreed as to the difficulty of palpating the healthy vesicles. Suprapubic cystotomy, in cases where the tubercular process is limited to the urinary passages below the ureters, is perhaps the best palliative treatment and also permits of direct local treatment, which may prove curative.

Senn² expresses the hope that if the operation of rectal implantation of the ureters can be perfected in such measure as to become feasible, it may be possible to successfully treat vesical tuberculosis by complete excision of the affected organ. The autoplasmic experiments of Rosenberg,³ in which grafts, cut from the intestines, were successfully used to fill gaps made in the bladder in dogs, leads us to hope that, through this procedure, the prognosis of tuberculous as well as malignant disease of the bladder may become less gloomy.

Instillations, every two to five days, of corrosive sublimate solutions is advocated by Desnoas, Langs, and Guyon⁴ in tubercular cystitis. At first a 1:5000 solution is used and the strength is increased gradually. Injections of iodoform have also many advocates in this form of the disease, and the results from its use in tubercular joint infections would lead us to expect good results from its use in the disease under consideration. Bryson (*loc. cit.*), however, condemns all antiseptic, bactericidal, and caustic applications and douches. All are agreed, so far as we know, that the complete removal of the disease foci is the proper procedure, where this is possible and feasible, but the methods of removal advocated are many, as has been seen.

Cystotomy, opening, draining, packing, and curetting of abscesses, in properly selected cases, as palliative measures also receive pretty general approval, and yet there seems to be a tendency among genito-urinary surgeons to favor medical in preference to surgical treatment of genito-urinary tuber-

¹ Read at the last meeting of the American Association of Genito-Urinary Surgeons.

² Principles of Surgery, p. 546.

³ Annual of Universal Medical Sciences, F. 38, 1894.

⁴ Annual of Universal Medical Sciences, F. 38, 1894.

culosis. In substantiation of this opinion I would refer you to the utterances of Bryson, Bangs, Keyes, Bellfield, Bell, and Chismore in the discussion of Bryson's paper on "The Question of Surgical Interference in Tuberculosis of the Kidney," read at the last meeting of the American Association of Genito-Urinary Surgeons.¹ This tendency is, no doubt, accounted for by the growing belief that uro-genital tuberculosis is usually secondary to tubercular processes elsewhere in the body. Again, the results of surgery in this disease have not been such as to win for it enthusiastic support, while cures, or at least obsolescence, of the disease under proper medical, climatic, hygienic, and dietetic treatment are not infrequent.

The medical treatment of uro-genital tuberculosis differs in no way from the treatment of pulmonary and other forms of tuberculosis, save for the modifications necessary because of the functions, positions, etc., of the diseased organs.

After this paper was written, and the day before the time set for its reading, the patient, whose history is above recorded, died, and we were permitted to make a *post-mortem* examination of the uro-genital organs. The body was much emaciated, *rigor mortis* not marked at twenty-eight hours after death, when the examination was made. Through an abdominal incision, the kidneys, several inches of both upper and lower ends of both ureters, the bladder and prostate, the left testicle and the distal one, and a half inch of the penis were removed. The remaining portions of ureters and urethra were examined *in situ*. The left kidney was somewhat contracted, the pelvis full of flocculent pus, and the substance of the organ riddled with abscesses and caseous nodules. The left ureter was larger than a large lead-pencil, the walls thickened, and the lumen filled with caseous material from the kidney to the bladder.

The right kidney and ureter were normal, save that the kidney was somewhat enlarged and congested, and opening into the pelvis was one small abscess cavity the size of a filbert.

The mucous membrane of the bladder showed general inflammation with spots of erosion. The prostate contained an abscess which held about one ounce of characteristic pus and *débris*, while between

¹ Medical News, June 16, 1894, p. 671.

the bladder and prostate, possibly within the prostate, there was a caseous nodule the size of a small almond. Both vesiculæ were enlarged, hardened, and presented the usual caseous degeneration. Both epididymes also presented caseous degeneration with hardening and enlargement, while both testicles were healthy, so far as could be judged microscopically. The urethra was inflamed, the mucous membrane and peri-urethral tissues thickened and hard, from the bladder to within about one inch of the meatus. This latter part of the urethra was ulcerated, and the surrounding tissues hardened, so that the meatus stood open, and so enlarged from erosion that the tip of my index finger could be introduced. There was no peritoneal infection.

I am much indebted to Drs. Senn, Bull, Kelly, Richardson, Wiest, for their kind replies to my letters of inquiry in connection with the preparation of this paper. Also to Dr. F. S. Cullin, of Johns Hopkins Hospital, for references furnished, and to my student, Mr. L. P. Drayer, for his painstaking examinations of the urine and urethral discharge.

THYROID ABSCESS; THYROIDECTOMY; RECOVERY.¹

By JOSEPH RANSOHOFF, M.D., F.R.C.S.,

CINCINNATI,

PROFESSOR OF ANATOMY AND CLINICAL SURGERY, MEDICAL COLLEGE OF OHIO;
SURGEON, CINCINNATI AND GOOD SAMARITAN HOSPITALS.

VASCULAR engorgement of the thyroid gland is often seen with menstruation, during pregnancy, and in young girls while the menstrual function is being established. In the latter the swelling is at times sufficient to constitute a form of acute goitre. Aside from the swelling and tenderness there are no evidences of inflammation. The normal thyroid gland, being enclosed in a firm capsule having no excretory duct and a low functional activity, is protected against the invasion of organisms unless introduced through the blood-supply. True inflammations of the normal thyroid gland are therefore rare. In the goitrous gland the disease is more common. Although cases have been recorded by Kerns, in 1839;¹ Massey, 1840;² Dixon, 1843;³ Velpeau, 1847;⁴ Wetzlar, in 1835;⁵ and German writers later sporadically, it remained for Lebert to treat the subject in a clearer way by the report of cases in 1862.⁶ All the cases occurred in goitrous subjects.

Abscess of the thyroid gland signifies an infection from without or within. Wounds of the gland, aspiration of cysts, interstitial injections with uncleaned instruments, or extension by contiguity of morbid processes from larynx or trachea are among the external sources of infection. Infection from within may occur during any of the acute infectious diseases. It has been observed after pneumonia, malaria, diphtheria, and relatively

¹ Read before the American Surgical Association, Washington, 1894.

most often after typhoid fever. Nevertheless, in a record of 1700 cases of typhoid, Liebermeister found only fifteen instances of swelling of the thyroid. In the puerperal state suppurative thyroiditis may be the first and chief evidence of sepsis. As part of a pyæmic process, abscess of the thyroid has been often observed. Abscesses of rheumatic origin have also been described. They may occur during the height of the articular disease, precede or follow it.

The previous existence of goitre doubtless predisposes to abscess. Lebert saw all of his cases in Zurich, where goitre is endemic, but none in Breslau. Kocher⁷ reports twenty-four cases of strumitis, in eleven of which aspiration, electrolysis, or interstitial injections had been made; of the remaining thirteen cases the predisposing causes already mentioned were found in six. Kocher directs attention to mild catarrhal affections of the alimentary canal as predisposing to strumitis. Suppurative thyroiditis is always of microbic origin. Eleven cases examined in this regard showed the presence of eight different forms of germs. Besides the ordinary pus forms found by Wölfler in 1889, the presence of the pneumococcus was demonstrated by Gerard and Marchant;⁸ the bacterium communis coli by Brunner;⁹ and the typhoid bacillus by Fauvel and Kummer.¹⁰

In the absence in this country of large numbers of goitrous subjects, abscesses of the thyroid are not often encountered. Cases have been recorded by Delafield,¹¹ Musser,¹² and Lydston.¹³ The experience of every observer is limited, therefore I beg consent to report the following cases:

CASE I.—Seen with Dr. Drury. Mrs. H., aged thirty-eight. Typhoid fever. No previous history of goitre. One week after convalescence there was a sudden rise of temperature to 103° F., accompanied by some pains in the throat, difficulty in breathing and swallowing. When seen there was present a uniform swelling of the left lobe of the thyroid, large as an orange, exquisitely tender to pressure, fluctuation distinct, skin not reddened. Aspiration removed several ounces of creamy pus, and markedly reduced the size of the swelling. Rapid filling up of sac. Further surgical intervention refused. After two weeks of severe suffering, spontaneous rupture,

and speedy cure. For a number of months considerable induration remained in the site of the abscess.

CASE II.—Miss H., aged twenty; of very nervous temperament; developed a parenchymatous goitre of the left lobe of the thyroid gland. Finding no relief from internal treatment and external applications, interstitial injections of ergotin were resorted to. While making one of the latter, in May, 1890; the needle of the syringe broke and remained embedded in the tumor. No immediate unpleasant results followed. The patient soon thereafter left the city for her summer vacation. During the next six months the patient was subjected to no further treatment. In the first months of 1891, the goitrous growth having made some progress, a neighboring physician made injections of Fowler's solution. I saw the patient again in November, 1891. She then presented an acutely inflamed thyroid gland. The tumor located on the left side was as large as a fist, and exquisitely tender to the touch. There was considerable dyspnoea and huskiness of voice and reflex cough, indicated implication of the recurrent laryngeal nerve. There had been several severe rigors; the pulse was rapid, and the temperature varied between 101° F. and 104° F. Patient somnolent and inclined to be cyanotic.

Operation November 7, 1891. Drs. Eichberg and Evans present. Incision three inches long over site of abscess, splitting of capsule with thermocautery, evacuation of about two ounces of pus, which at first was creamy, but from admixture of blood soon became dark. With the finger in the cavity a second abscess was readily located and opened by lacerating the gland-tissue with the finger. Notwithstanding most careful palpation, no trace of the needle could be found. Hæmorrhage from the abscess wall was very profuse. The thermocautery did not suffice to check it. It finally yielded to thorough packing of the cavity with sterilized gauze and closure of the wound with sutures.

So far as the general condition of the patient is concerned, for the time being she made an excellent recovery from the operation. The gauze packing was removed on the fourth day. Suppuration continued for a number of months, and apparently, under injections of peroxide of hydrogen, ceased altogether after two months. The closure of the wound was not permanent, however. Without severe general or local symptoms, reaccumulations ensued and discharged spontaneously three different times between January and June of 1892. When the patient left for the sea-shore a fistula discharging a drachm

of pus daily remained. On her return from the East in the fall, it was evident that the patient had not improved.

The thyroid was again as large as a fist. The fistulous opening had contracted until it only admitted the finest probe, and the patient was never without some elevation of temperature. During two months a number of quite severe hæmorrhages had occurred to further reduce the patient. There were also present unmistakable evidences of Graves's disease. Her pulse was always rapid, and cardiac palpitations were very frequently experienced. There were general muscular twitchings and marked tremulousness of the voice. Exophthalmus was not present, although consensual movements of the eyelid and globe were decidedly impaired.

Notwithstanding this feature of the case, it was determined, after consultation with Dr. Connor, that a speedy exitus from subacute sepsis could only be averted by extirpation of the left lobe of the thyroid gland.

Operation November 17, 1892. Incision six inches long, over axis of tumor, through skin and deep fascia. Exposure and ligation of superior thyroid artery. The separation of the gland from its bed necessitated the use of between sixty and seventy double ligatures of catgut for the smaller and silk for the larger vessels. Exposure and ligation of the inferior thyroid artery between two ligatures. With the left lobe loosened from its bed, a pedicle was made of the isthmus of the gland, and a stout ligature applied. Gauze drainage and suture completed the operation. So far as the wound was concerned, the patient made a recovery uninterrupted, save by the expulsion of four of the larger ligatures.

The wound had healed permanently two months after the operation. An examination of the specimen showed the presence of an hour-glass-shaped cavity lined with very vascular and exuberant granulations. As substratum to these was a dense layer of fibrous tissue, within which was embedded the hypodermic needle. It was found in the abscess wall, well removed from the cavity.

Eighteen months after the operation the condition of the patient is as follows: Firm linear scar at site of operation. Remaining portion of thyroid gland normal. General condition very much improved. There has been a gain of fifteen pounds in weight. The symptoms of Graves's disease, present before the operation, are still recognizable, but very much less pronounced. Under the thyroid extract they can be brought into almost complete abeyance.

The case presented is interesting in the tardy establishment of the suppurative process, which probably followed either the injections or the breaking off of the needle. For eighteen months after the last-named accident occurred no evidence of suppuration was discerned. The rapidity with which the presence of pus makes itself manifest varies within wide limits. In the acutest forms, agglutination of the overlying soft parts and perforation of the capsule occur in from two to three weeks. Sloughing of the gland from excess of intracapsular tension has been observed as early as the tenth day. Where the dosage of infection has been slight, as from the use of unclean instruments, months may pass before the abscess perforates its capsule. Such cases often assume from their inception a subacute or even chronic course. The rapidity with which pus is finally evacuated doubtless is modified by the depth of the abscess. Thyroid abscesses are generally limited to one lobe. They are single or multiple. In the latter cases, as in the one reported, intensely vascular gland-tissue is found between the foci. The tendency of thyroid abscesses is towards the integument. Retention of pus beneath the cervical fascia sometimes leads to fatal mediastinitis. Perforation into the trachea is not very rare; whereas rupture into the œsophagus is less often seen. In fulminating cases gangrene may develop with the retention of gases of decomposition. Although always of considerable gravity, thyroid abscesses are especially grave when they complicate puerperal infection, pyæmia, or diphtheria. When the suppuration develops in a goitre which, by its size and attachments, has compressed the trachea or larger blood-vessels, the increased pressure may speedily cause death. Other causes of death are acute sepsis, hæmorrhage, and exhaustion from prolonged suppuration. According to Lebert suppuration ensues in 60 per cent. of all cases of thyroiditis, and 25 per cent. of all cases are fatal. Modern methods of treatment have doubtless modified the mortality of suppurating cases, since among eighteen cases recorded since Lebert's publication, and in which the thyroid abscess was not part of a pyæmic process, only four ended in death.

Aside from pus absorption, the gravity of thyroid abscess

depends on hæmorrhages, and the exhaustion incident to prolonged suppuration. Grave and even fatal hæmorrhage may follow tapping and incision. By delaying incision until the abscess is quite superficial, and thereby reducing to a minimum the thyroid tissue to be divided, this source of danger can in a measure be eliminated; but not altogether. With the relief of tension given by the flow of pus, violent hæmorrhage is, as a rule, to be looked for. Fortunately, gauze packing suffices to check the flow, although probably from no other abscesses are recurrent hæmorrhages so common. Eder¹⁴ reports a case in which incision was followed by profuse hæmorrhage, temporarily checked by the thermo-cautery. Reappearance of the hæmorrhage necessitated extirpation of the central portion of the gland. That injection into an opened thyroid abscess is fraught with danger, is shown by a case of Mosetig-Moorhof,¹⁵ in which death within a minute followed the use of chloride of zinc.

In looking over the literature of thyroid abscesses, I have not been enabled to find an instance in which long-continued suppuration was relieved by extirpation of the part of the gland involved. Fortunately, the great majority of thyroid abscesses yield to incision, although a few cases are recorded in which discharging fistula remained for many months. Many cases are recorded in which the patient was still under treatment at the time of the report. As long ago as 1839, Kerns reported a case in which sloughing of the gland was followed by a permanent fistula which led towards the sublingual gland, and discharged only during mastication. It is more than probable that in this case the suppuration developed in the vertiges of the thyro-lingual duct. Fistula remaining after abscesses have likewise been recorded by Boucher¹⁶ and Barling.¹⁷ In the case of the last-named writer the abscess had also perforated into the pharynx.

A study of the cases reported of suppurative thyroiditis at my command shows that those which develop acutely, and in the wake of infectious diseases, run a more rapid course towards recovery or death than do those in which the suppuration presumably is the result of direct infection through surgical treatment of cystic

or parenchymatous goitres. The thickened cyst-wall collapses with difficulty after evacuation of its contents. That a discharging sinus occasionally remains is but to be expected. Where foreign bodies in the gland have provoked suppuration, it is but natural that a purulent discharge continues until their final expulsion.

A very interesting feature of the case presented is the relation of the goitre to Graves's disease, which, though ameliorated since the final operation, still exists. When first seen there were no evidences thereof other than the goitre. This was distinctly limited to the left lobe. After suppuration had greatly increased the size of the gland, and continued for many months, unmistakable evidences of morbus Basedowii supervened. Although, according to Marie, only one of the cardinal symptoms, like goitre, in combination with some of the nervous phenomena, tremor, insomnia, or hyperidrosis, may be sufficient to confirm the diagnosis, the goitre in the case described was unilateral, and not the uniform enlargement of the entire gland generally found. Until after the extirpation of the diseased half of the gland, the tachycardia, huskiness of voice, and tremor were considered the result of the mechanical irritation of the sympathetic and the recurrent nerves. It was believed to be a case of surgical as distinguished from the true morbus Basedowii, in which cardiac, ocular, and nervous symptoms are often developed out of all proportion to the size of the goitre. In the recent and admirable tabulation of Freiberg¹⁸ on the surgical treatment of Graves's disease, in cases doubtless of surgical origin, the symptoms were relieved by surgical treatment of the goitre in nine out of ten cases. Of eleven cases of true morbus Basedowii, seven were reported cured by operation. In nine of the cases total or partial extirpation of the tumor was practised. Death did not result in any case from the operation. The fact that extirpation of the goitrous gland in morbus Basedowii is comparatively devoid of danger has been established. Not so, however, the certain curability of the disease by the operation. That many of the cases have been greatly improved cannot be questioned. In what proportion of cases permanent and absolute relief has

been brought cannot as yet be determined, since many of the cases were reported within from six weeks to six months of the operation. Only in a few cases, as in one of Riedel's (three years), has sufficient time elapsed since the operation to designate the result obtained as perfect and permanent.

REFERENCES.

- (1) *Thos. Kerns*, *Dubl. Med. Press*, 1839, II, p. 37.
- (2) *J. Massesey*, *Lond. Lancet*, 1840-41, I, p. 583.
- (3) *E. A. Dixon*, *Bost. Med. and Surg. Journ.*, 1843, XXVIII, p. 15.
- (4) *Velpéau*, *Gazette des Hôpitaux*, 1847, IX, p. 227.
- (5) *Wetzlar*, *Journ. des Chir. u. Augenheilk.*, XXVI, p. 517.
- (6) *Lebert*, *Krankh. der Schilddrüse*, Breslau, 1862, pp. 44-68.
- (7) *Kocher*, *Langenbeck's Archiv*, XXIII, p. 113.
- (8) *Cong. Chir. Franç.*, 1891, p. 268.
- (9) *Brunner*, *Schweiz. Corresp.-Bl.*, 1892, XXII, pp. 307.
- (10) *F. u. K.*, *Wien. Med. Presse*, 1891, XXXII, p. 1620.
- (11) *Delafield*, *N. Y. Med. Rec.*, 1873, p. 210.
- (12) *Musser*, *Phila. Med. Bull.*, 1887, IX, p. 67.
- (13) *Lydston*, *N. O. Med. and Surg. Journ.*, 1891-92, XIX, p. 815.
- (14) *Eder*, *Aertzl. Bericht. d. Heil-Anst.*, Wien, 1882, p. 18.
- (15) *Mosetig-Moorhof*, *Ber. d. K. K. Krank.*, Wieden, 1879, p. 129.
- (16) *Boucher*, *Arch. d. Méd. et Pharm.*, 1886, p. 353.
- (17) *Barling*, *Birmingham Med. Rev.*, 1890, XXVIII, p. 151.
- (18) *Freiberg*, *Med. News*, 1893, p. 225.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, May 23, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

ILEOTOMY FOR DIFFUSE CARCINOMATOUS INFILTRA- TION OF THE COLON.

DR. CHARLES K. BRIDGON presented a patient, a man, thirty-four years of age, who, twelve years ago, began to be troubled with constipation, painful defecation, with occasional bleeding, some rectal tenesmus, and piles. This condition continued—now better, now worse—for two years, his constipation, however, being succeeded by more or less diarrhœa. He was then operated on in the New York Hospital for what his doctors told him was “stricture of the rectum.” Two years later, in 1887, his symptoms still persisting, they advised him to have an artificial anus made. He did not consent to it. Since then he has continued to be troubled, more or less all the time, with diarrhœa, occasional bleeding, not very much pain, but a dull ache in the left inguinal region present most of the time, especially for the last three months. He affirms that in the summer he loses weight, but that in the winter he always picks up again. He has gained weight since last September.

When admitted to the Presbyterian Hospital, April 12, 1894, his appetite was good. He had six to eight dejections a day, which were loose, containing blood and mucus and were offensive. Rectal examination—the patient being in the knee-chest position—was negative. While the patient is sitting or lying down, however (on his side), an indurated, ulcerated mass could be felt about six inches up the rectum. Following the examining finger came stinking, chocolate-looking, bloody *débris*.

An attempt was first made to do a left inguinal colotomy. In this region, however, the colon was found to be thickened by general

infiltration, and to be so bound down to the posterior wall of the abdomen that it was found impossible to bring the altered colon into the wound. The tumor reached up as far as the examining finger could go.

An attempt was then made to create an artificial anus on the right side by bringing up the cæcum at that point. It, too, was found to be the seat of the same growth. From this the whole colon was judged to be the seat of similar trouble, and it was deemed useless to open it anywhere in its course. The ileum was then sought for. It was found to be healthy, and was, therefore, brought up into the wound two or three inches from its termination in the ileo-cæcal valve, and stitched to the abdominal wall.

The gut was opened on the third day. Since then it has been discharging steadily at intervals. The opening remains patent. The man still has considerable bloody discharge from the rectum, of offensive odor, the same mass can be felt by rectum. The patient's general condition is much as before except that the operation has relieved him almost entirely of his pain.

Dr. Briddon had not been able to find a record of any such general infiltration of the coils of the large intestine as were found in this case. On first exposing the sigmoid, its coats were found uniformly involved; drawing down the descending colon, it could be examined as far as the splenic flexure, and similar conditions found; traced downward, the thickening gradually increased, terminating in a hard cartilaginous mass in the cavity of the pelvis. On making the section on the right side, the cæcum was found in the same condition and drawn upward, as if by shortening of the whole length of the colon.

There was no papillomatous condition. The colon was infiltrated with pinkish-colored nodules, looking like grains of boiled sago, but quite unlike the infiltration of miliary tuberculosis. He had seen a similar condition in the stomach four or five years ago. The patient, a colored woman, had a movable tumor, supposed by some who had seen her to be a floating kidney. It lay just above the umbilicus, and could be pressed into the locality of the right kidney. Dr. Briddon made abdominal section and found the tumor to be the stomach, about the size of a large cocoanut, its walls, except at the greater curvature and pylorus, being infiltrated to the thickness of three inches, its attachments so long that he was able to lift it entirely out of the abdomen. Underneath the peritoneum was the finely granular condition seen in the patient just presented. The gastro-

hepatic omentum was also implicated in the disease. Although the operation proved to be only exploratory, the patient's condition was improved greatly at the end of three months, when she left the hospital. Dr. Briddon added that there could be no doubt of the malignant character of the case now presented, the appearance of the colon and the hard mass felt in the rectum pointed clearly to that diagnosis.

EPITHELIOMA INVOLVING FRONTAL SINUS AND NOSE.

DR. W. W. VAN ARSDALE presented a man fifty-seven years of age, who fourteen years ago first noticed a small purplish spot on the nose, which was generally covered with a scab. Six years ago this was cut out. Two years afterwards it returned and went on to slowly increase in size until one year ago when it spread rapidly. At that time, June 13, 1893, the patient entered the New York Cancer Hospital, and was operated upon by Dr. B. F. Curtis, who removed a large ovoid growth reaching from the nasal eminence of the frontal bone to within three-fourths of an inch of the tip of the nose. Later, July 17, Dr. Van Arsdale, having charge of the ward, performed a rhinoplastic operation, scraping the granulating wound with the curette, trimming the edges with the scissors, after which a large flap was turned down from the forehead and attached with fine silk. The pedicle of the flap was left attached nearly an inch above the inner angle of the left eye. The gap on the forehead was filled with skin grafts from the thigh under dressing with sterilized normal salt solution and rubber tissue. The dressing was changed on the 20th; on the 26th all the grafts had taken on the forehead, and August 7 the man was discharged, an opening, leading to the frontal sinus, having been left near the canthus of the right eye. This opening constituted the only unusual feature in the case, and was left in order to furnish ready access to the frontal sinus should recurrence take place. Thus far there had been no recurrence, and the cosmetic effects of the operation had also been of the most satisfactory kind.

DR. B. F. CURTIS remarked that the most interesting point in this case seemed to him to lie in the fact that at the time of the first operation about two teaspoonfuls of epitheliomatous material were curetted from the frontal sinus, the small bones of the nose were removed in the same way, yet there had, after this length of time, been no evidence of recurrence. If the parts retained their healthy appearance until next fall, he would feel encouraged to close the opening leading into the frontal sinus. As was well known, recur-

rence was apt to take place rapidly where the frontal sinus was involved by malignant disease.

TUBERCULOSIS OF THE BREAST.

DR. CHARLES A. POWERS read the paper of the evening upon this subject. (See p. 159.)

DR. BRIDDON inquired of Dr. Powers whether in any of the cases infection of the breast had been traced to the nursing tuberculous child, and receiving a negative reply, added that while he had seen no cases himself, yet the possibility of infection from that source seemed reasonable when one considered the number of tuberculous babies with sore mouths and mothers with sore nipples.

NEPHRECTOMY.

DR. BRIDDON presented a kidney removed from a patient who had suffered from symptoms of renal calculus for several years, and who was subjected to the operation of nephrolithotomy in the Presbyterian Hospital, in the month of January, 1894, when a large stone was removed from the pelvis of the kidney; the general condition of the patient was very much improved, but he continued to discharge a considerable quantity of urine through the aperture in his loin; sometimes it would cease for a few days when a 1-per-cent. solution of creolin injected through the fistulous opening communicating with the ureter passed into the bladder; more often this channel was closed and the urine passed through the operation wound and was a source of much annoyance. After waiting four months, it was determined to remove the kidney; and the operator said it was the most difficult nephrectomy he had ever performed; vertical and transverse incisions gave ample room; the cicatricial tissue was so dense that digital enucleation had to be supplemented at almost every step by the knife and scissors. The dissection was carried first to the inner side of the fistulous track, and below the quadratus, until the posterior surface was found at a considerable depth; and the pale color of the organ made it difficult to distinguish it from the surrounding condensed fatty tissue; then it was separated externally and in front, where the colon was found intimately adherent. The ureter was first isolated and ligatured at its junction with the pelvis, then the vein and artery were each secured with a separate ligature. Up to the present date the after-history had been uneventful.

The specimen illustrated the advanced condition of a dilated and chronically-diseased kidney; the pelvis in which the calculus lodged and the calyces had contracted after the first operation; but the evidences of dilatation and thickening of their coats were sufficiently well marked; there was little renal tissue to be recognized by the naked eye, but there was sufficient to keep up a very annoying discharge.

INTUSSUSCEPTION; DEATH AFTER LAPAROTOMY; REDUCTION.

DR. BRIDDON reported the following case of intussusception: The patient was a small infant, eight months of age, who entered the Presbyterian Hospital on the afternoon of May 10, 1894.

It had been apparently perfectly well until twenty-four hours before; had been playing with other children in the morning; after this had slept for several hours, waking up suddenly with considerable abdominal pain followed in a short while by vomiting; a few hours later it had a stool which the parents say was perfectly normal. The pain kept up, and in the evening it had a bloody dejection, followed by others in the course of the night and the next morning. Each time the baby was nursed it would vomit.

From the history a diagnosis of intussusception was made, and operation advised. There was no protrusion from anal orifice, but a mass could be made out by the examining finger three to four inches up the rectum. By abdominal palpation also a firm, sausage-shaped mass could be made out running from the ribs to the brim of the pelvis on the left side. Under chloroform a median incision about six inches long, with its centre about at umbilicus, was made. The cæcum was sought for by following up the distended large intestine. This was found to be the seat of the trouble. The whole length of the colon seemed to be filled by the invaginated portion; while the finger of the assistant was passed through the anus and exerted pressure on the gut in the rectum by manipulation of the exposed colon, the invaginated mass was easily forced up to the immediate neighborhood of the constriction, but beyond this it could not be made to go.

During this process the invaginated portion could be plainly seen through the distended coats of the large intestine, sliding by as it was pushed up more and more in the direction of the ileo-cæcal valve. As well as could be ascertained, the neck of the intussusciens was situate at about the hepatic flexure.

Attempts at reduction by compression applied from below proving ineffectual, slight traction was resorted to, applied to the small intestine above. Such traction, however, of the internal cylinder, as the unpromising condition of the parts seemed to warrant, appeared to exercise no influence in the direction of delivery, and only after gentle dilatation of the sheath was the sudden release effected by the combined action of compression and traction. The part that had resisted almost all efforts at reduction was the invaginated cæcum, the walls of which were almost black, fading into a dark maroon color, and converted into a solid mass by the infiltration of its walls with coagulated blood. The application of hot towels to the gut pending the introduction of sutures into the abdominal walls improved its condition sufficiently to warrant its return.

Dr. BRIDDON added that the intussuscepting portion of the gut was very much dilated, its diameter being about that of a drinking-glass, its walls so thin that the intussuscepted part could be seen moving up and down within. Notwithstanding its extreme thinness, the only way in which reduction could be effected was by further dilatation with the finger and pressure. Of course this was made with care, and would have been more dangerous had the condition not been of so short duration. The dark-colored portion of gut soon took on a lighter hue, showing that it was due to stagnation of blood and not to gangrene, and was then returned to the abdomen. The child was already in collapse, but lived four or five hours.

Dr. ABBE was reminded by Dr. BRIDDON's case of one seen by himself about a year ago, in which he operated about sixteen hours after the intussusception occurred. The tumefaction was so great that it was impossible to effect reduction of the colon until the stretching process had been continued for some time. The adhesions between the layers of gut were much stronger than one would suppose could take place in so short a time. Although the reduction was finally complete, the child died within twenty-four hours. A similar experience with a man, in whom, however, the parts had gone to the extent of sloughing, led Dr. Abbe to feel that it might be safer to make an artificial anus, and later to deal further with the case as the circumstances might demand.

Dr. BRIDDON thought it would have taken as long to make an artificial anus in his case as to reduce the invagination. Probably not more than five minutes were spent in handling the gut.

Dr. DAWBARN, referring to milder cases of intussusception in

which other measures than laparotomy were considered first, said he had tried a device which, while it may have been recorded before, was new to him,—namely, the introduction of water impregnated with carbonic acid gas through a Nélaton catheter placed over the siphon of a fountain. In one case, that of a child, the method succeeded nicely; in another, it failed completely to make reduction. In the latter he then operated, and although not more than five minutes were consumed, the child died. Recently, a physician from the South had told him that he was present in Richmond at a case of intussusception in an adult when a surgeon was about to operate, and a gentleman present suggested that injection of glycerin be tried. After hesitating a moment the surgeon agreed to this proposition. The patient was placed in Trendelenburg's posture, and a quart and a half of glycerin was introduced into the rectum. After half an hour the recumbent posture was restored, and the gut emptied itself with great noise, showing that reduction had been effected. As to making an artificial anus, he thought Maunsell's operation could be performed in half the time, and save a second operation.

DR. BRIDDON said he was in the habit of first trying reduction of the intussusception by inverting the patient and injecting water, and had seen it succeed; but in the present case he thought the condition found at the operation proved conclusively that it would have been a dangerous procedure. While he would admit the propriety of trying reduction by water introduced into the rectum, he did not think he would ever use gas.

DR. DAWBARN remarked that it was well known there was good authority for using gas as well as for using water. He agreed with Dr. Briddon, that in his case it probably would have been unsafe. It should be used with the utmost caution in any case. He knew of no means by which the force of gas could be more accurately adjusted than by the trigger of the siphon.

DR. CURTIS believed the use of the siphon had been condemned by all writers, and ought to be condemned by this society. He regarded it himself as a very dangerous method. The pressure within the siphon was tremendous, something like 200 pounds to the square inch, he believed. Of course it was possible to introduce a small quantity of the gas at a time, but it was impossible to say how much was the pressure in the lower part of the gut unless the obstruction had been overcome, and there was equal distention throughout its entire length. The only safe method, the one which would enable

the physician to accurately estimate the amount of hydrostatic pressure, was that of connecting the rectal tube with a fountain elevated a known distance above the patient. A fall of about fifteen feet would give a pressure of eighty pounds to the square inch, which might be used with safety in the adult. In the child a much lower fall was to be used. As to the siphon, it was little in advance of the suggestion made by the older surgeons, to introduce an effervescing powder into the bowel.

DR. BRIDDON remarked that he had never seen a case of intussusception in a child under a year old recover.

DR. ABBE had seen a very striking case of intussusception two years ago with Dr. Holt, which was relieved by hydrostatic pressure, the pail being lifted about five feet above the inverted child. He learned from Dr. Holt that the same child had intussusception again a year afterwards and died.

DR. VAN ARSDALE mentioned a case of intussusception in a child under a year of age which was treated as Dr. Abbe had proposed, by making an artificial anus, but it died. In two other cases treated in St. Elizabeth's Hospital the same year, one was operated upon, and reduction effected within about six hours, the other within twenty-four hours, but both patients died shortly afterwards. He thought death in such cases was usually due to the effects of the intussusception itself, not to the operation.

DR. DAWBARN thought that, in view of the vigorous reverse peristalsis produced by chloride of sodium and carbonate of sodium, as shown by Nothnagel's experiments, it might aid the mechanical effects of the injected water in effecting reduction of the intussusception to add to it one or other of these agents.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, June 4, 1894.

The President, Dr. WILLIAM HUNT, in the Chair.

A CASE OF PYÆMIA DUE TO APPENDICITIS.

DR. RICHARD H. HARTE related the history of the following case: A. C., aged twenty-five years, was admitted to the medical wards of the Episcopal Hospital, May 9, 1894, supposed to be suffering from abscess of the liver.

He had enjoyed good health, although not especially robust, except about three years ago when he had a short illness ushered in by a chill, accompanied by sharp cramp-like pains referred to the lower third of the abdomen. He was confined to bed for a week. About two weeks previous to admission to hospital, he was awakened with sharp pains in the right iliac fossa, and in the course of the morning they were followed by a pronounced chill, succeeded by sweating; through the day he felt nauseated, and in the evening vomited.

During the interval of two weeks from the time of his first attack until his admission into the hospital, he had always once in twenty-four hours, and sometimes oftener, a decided chill followed by profuse sweating; pain, referred in the right iliac, umbilical, and hypochondriac regions, was almost continuous; the bowels were watery, and moved daily; the patient was confined to bed and growing weaker.

After his admission into the medical ward all his symptoms were referred to the region of the liver, over which there was distinct tenderness. The daily chill and high temperature (106° F.) naturally led to the suspicion of abscess of the liver, and he was transferred to the surgical wards for operation.

On examination of the abdomen, a distinctly morbilliform eruption was seen to be pretty generally distributed over the entire trunk. On the next day an incision corresponding to the right semilunar line

was made which gave a free opportunity to explore the surface of the liver, which appeared normal. An exploration with an aspirating needle failed to reveal any purulent collections. The region of the appendix was explored through the abdominal wound, suspecting that possibly it might be the seat of the trouble; but with the hand carried down over the liver to the right iliac fossa, no evidence of trouble was apparent.

After this operation the chills seemed to be less severe, not being so frequent as before, and the temperature not rising so high. The external wound closed quickly, and no symptoms relative to the operation were manifest. The next chill was four days after the operation, and the temperature did not rise to within two degrees of the height of the previous one. The next chill did not appear until the fifth day, although the patient was gradually growing weaker. He died on the tenth day after the operation. After the second chill he began to expectorate bloody mucus, sometimes a cupful of blood being expectorated during the twenty-four hours.

A post-mortem examination revealed the liver slightly enlarged and filled with a large number of metastatic abscesses, the principal pus collection and largest abscess being in the left lobe. The appendix was entirely destroyed, and its position occupied by a small pus-cavity holding about three drachms of pus. The cæcum for several inches beyond its attachment to the appendix was gangrenous. There were some septic deposits in the lungs, although no distinct infarcts were to be found.

DR. WILLIAM J. TAYLOR said that in an autopsy made by him some ten years ago an ulcerated condition of the bowel, undoubtedly due to inflammation around the appendix, was found. There were also pyæmic abscesses throughout the liver. The patient, a boy fourteen years of age, had died of general pyæmia due to infection from this inflammatory condition of the appendix.

DR. T. S. K. MORTON had never met with pyæmia where abscess about the appendix was found, but he recalled a number of instances in literature where pylephlebitis had extended from the abscess cavity directly to the liver. He had seen one or two cases where intense jaundice accompanied this condition. Here it was quite evident that the infection about the appendix had travelled by the lymphatic or venous route to the liver.

DR. HUNT remarked that pyæmia associated with appendicitis must be a rare condition. He did not recall having seen it.

DR. L. W. STEINBACH said that one of the cases referred to by

Dr. Morton was one of appendicitis in a young man and was under his own care. He saw him for the first time on the fifth or sixth day of the disease. Slight jaundice was present at the time of operation, but increased rapidly after the operation. The patient lived a week or ten days after the operation.

ON THE USE OF BACTERIOLOGICAL EXAMINATIONS
TO DETERMINE THE NECESSITY FOR
ABDOMINAL DRAINAGE.

DR. C. B. PENROSE stated that surgeons drain the abdomen for two reasons,—for hæmorrhage and for septic material. As the experience of the operator increases and his skill in enucleating tumors becomes greater, he has less hæmorrhage, and, other things being equal, he drains less. Our methods of controlling hæmorrhage in abdominal operations are better than they were a few years ago, the Trendelenburg posture enabling us to check bleeding from small vessels in the bottom of the pelvis, which before the introduction of this position required drainage. The operator who enucleates pelvic tumors with two fingers and closes the abdomen without seeing what he has done will necessarily have much more doubt in regard to hæmorrhage, and will use the drainage-tube much more frequently than the operator who inspects the field of enucleation before closing the abdomen.

The second reason for drainage is the septic character of the material which escapes or is retained in the abdomen. Knowledge in regard to this fact is of great value in deciding about drainage in any case.

During the past winter, at the University Hospital, an immediate bacteriological examination has been made of the contents of every tubal or ovarian tumor which was ruptured during removal, and the report of the pathologist in regard to the septic or aseptic character of the contents has determined the operator's decision in regard to the use of the drainage-tube.

Out of a series of forty-six cœliotomies, in which drainage was used but three or four times for hæmorrhage, and only once because the microscope showed the material which escaped into the abdomen to be septic, there has been no case of peritonitis or sepsis.

The tubal contents in most cases of salpingitis are sterile. Shauta (*Archiv für Gynäkologie*, 1893, No. 44) reports 192 cases of salpin-

gitis, in 144 of which the contents of the tubes were sterile, in 33 there were gonococci, and in 15 streptococci or staphylococci.

Before he began to use this method of bacteriological examination he inserted a drainage-tube in every case of tubal and ovarian abscess where the contents escaped into the peritoneum. Now he neither irrigates nor uses the drainage-tube unless the microscope shows these contents to be septic. The presence of gonococci in small numbers does not necessitate drainage. Recently the value of this bacteriological examination was illustrated by two cases operated on consecutively. Each woman had a tubo-ovarian abscess caused by sepsis at labor. In each case the abscess was ruptured during removal, and the pelvis filled with pus. In the first the pus was found to be sterile, and he closed the abdomen without irrigation or drainage. In the second one pus contained streptococci and staphylococci and coli commune. Consequently, the pelvis was thoroughly washed out and drained.

Both women recovered without peritonitis or sepsis, though the convalescence of the first was very much easier than that of the second.

Cover-glass preparations of the material to be examined are made, and are fixed in the flame of an alcohol lamp, and stained with carbol-fuchsin. The microscopic examination is made with a Leitz $\frac{1}{2}$ immersion lens.

EDITORIAL ARTICLES.

LANZ ON THE THYREOID QUESTION.¹

IN an elaborate essay upon this subject, Lanz, of Bern, states that to Schiff is due the credit of first demonstrating by experiments upon animals that the thyroid is not, as had been hitherto supposed, an organ of no importance. Kocher's reports of the results of thyreoidectomy in man, presented before the German Surgical Congress, at Berlin, in 1883, have excited such general attention to this subject that from that time on the thyroid question has been a subject of lively discussion; and Horsley, in 1891, in his thorough analysis of the subject, has removed the least doubt that the thyroid gland has a specific and very important function.

In the year 1873, Gull described a cretinoid affection, which later (1877) Ord designated by the name myxœdema. Ord observed in this new disease the degeneration of the thyroid gland, which could not be etiologically associated with the disease. Charcot, in 1881, described the disease as *cachexie pachydermique*, but did not go into the pathology of the malady.

The similarity between the symptoms described by Kocher as following extirpation of the thyroid and the disease of myxœdema, first observed in England, occurred to Felix Siemon as being a very striking one, and led him to suppose that the latter might be due to some destruction of the thyroid. That the cause of the myxœdematous systemic changes were to be sought for in the thyroid was the conclusion reached by the "myxœdema commission" in 1888, because, without exception, in every one of the several hundred cases

¹ Lanz: Zur Schilddrüsenfrage, Sammlung klinische Vorträge, No. 98, 1894.

examined, the only constant change found in the body was an atrophy or degeneration of the thyroid gland.

The differences in the symptoms of myxœdema and cachexia thyreopriva, to which Bircher has called attention, consist only in the different manners in which the thyroid becomes degenerated. The experimental observations made by Schiff, Horsley, and Fuhr confirm the clinical observations of Kocher and Reverdin. Horsley has removed the thyroid from apes, and produced a disease similar to the cachexia thyreopriva.

The similarity between goitre and cretinism has been known for a long time. Virchow expressed himself that endemic cretinism did not exist in any single part of the world where endemic goitre was not also found. The production of the operative cachexia has established the connection between the two diseases, and Kocher was the first to declare that the cachexia thyreopriva and the real cretinism are one and the same affection, be the latter due to goitrous degeneration or to the absence of the thyroid gland.

As soon as the pathological identity of operative cachexia, myxœdema, and real cretinism were recognized, it became evident that for the general designation of the disease, as it appears in connection with degeneration or absence of the thyroid gland, the name cachexia thyreoidea, suggested by Kocher, had best be adopted, not only for the myxœdema, but also for the operative form of the disease. The first, together with its infantile form—cretinism—may be called cachexia thyreopriva, and the second—the active form—may be called cachexia thyreoidectomica. The expression myxœdema should be entirely dropped, as it is only a symptom, and not the real disease. It certainly would not be appropriate to designate the disease-process of cirrhosis as ascites.

As has already been stated, Horsley, in 1891, collected and sifted all of the evidence which had accumulated up until that time. Lanz has made it the object of his paper to give a *résumé* of the subject, and bring up to date a topic which has received so much scattered attention during these few past years. He takes up the subject

where Horsley left off in 1891, and assumes from the beginning that the Englishman's work is well known, as well as that of Hofmeister,¹ which appeared about the same time.

Development of the Thyreoid.—It is agreed that the epithelium of the thyreoid gland develops primarily from the epithelium of the wall of the neck, at the level of the second branchial arch. The publication of Wölfler² has done much to advance our knowledge of the embryology of the thyreoid; and more recently are the publications of Dohrn³ and His.⁴ According to His, a cavity is shut off by the union of the two segments of the hyoid bone, from which develops an epithelial alveolus. This epithelial inclusion or sac is that part which becomes the odd or middle lobe of the thyreoid, which, for a long time during the process of its development, communicates at the root of the tongue with the epithelium of that organ. The outlet canal, which begins at about the thyreoid cartilage, and which eventually becomes obliterated, is the so-called ductus thyreoglossus, and the remains of its mouth can be seen in the foramen cæcum of the tongue. The origin of the two lateral portions of the thyreoid, which eventually become fused to the middle portion, as Born first pointed out, is not as yet explained. Born believes that they originate from the fourth branchial pouch. His and Bemmelen believe that the origin must be sought not only in this but also in the primary parts of the floor of the mouth, as is the case with the middle lobe, which becomes shut off from the chief cavity in the process of development. The central piece later becomes united with the lateral parts of the gland. His has observed in an embryo 9.1 millimetres long that, before this amalgamation takes place, the middle portion gives off two lateral horns which may take part in the formation of the lateral lobes. In an human embryo sixteen millimetres long he

¹ Fortschritte der Medicin, Nr. 3 u. 4, 1892.

² Entwicklung und Bau der Schilddrüse, Reimer, 1880.

³ Entwicklung und Bedeutung der Glandula Thyreodea, Mittheilungen der Zoologie, L. Station in Neapel, 1886.

⁴ Der Tractus Thyreoglossus und seine Beziehungen zum Zungenbein, Arch. für Anat. u. Physiol., 1891, S. 26.

observed that the hyoid bone projected into the thyreoglossal tract in such a way that its upper portion began in front of the body of the hyoid bone, and the lower portion began below the hyoid bone. This is explained by the fact that the accessory thyreoids and cysts arising from the upper portion of the *ductus thyreoglossus* lie in front of the hyoid bone, though the *processus pyramidalis* is inserted behind the same. Nevertheless, Kanthack¹ denies that there is any embryological connection between the foramen cæcum and the thyreoid gland.

Comparative Anatomy.—Dohrn agrees with W. Müller that the thyreoid of the ammocoetes is identical with the hypobranchial ridge of the tunicatæ and the amphioxus, though there are many important differences. Müller was the first to show that the hypobranchial ridge of the tunicatæ is a homologue of the same structure in the amphioxus. Rolph, Langerhans, Rohon, and Dohrn have made a special study of the same, and regard it as originating by an inclusion from the middle cavity of the gill-region.

In the ammocoetes and the larva of the petromyzon the communication of the thyreoid with the lumen of the throat is at first very large, but later becomes contracted so that the gland has the appearance of a diverticulum of the œsophagus. In the grown petromyzon the gland becomes shut off from the throat-cavity, and follicles develop just as in other vertebrates.

In the higher order of cartilaginous fishes the separation of the thyreoid from the digestive canal is complete. It lies as a single organ beneath the symphysis of the lower jaw, exactly in the middle line, at the bifurcation of the trunk of the gill artery, and between this and the capula of the arch of the hyoid bone. In the bony fishes there are a pair of thyreoid glands developed during the postfoetal period which lie at the posterior ends of the first branchial arch. So in the amphibiæ and birds there are a pair of thyreoids which are entirely shut off from the inside of the throat, and which come finally to lie more upon the ventral aspect of the trachea or larynx.

¹ The thyreoglossal duct, *Journal of Anatomy and Physiology*, Vol. xxv, P. II, p. 155.

It is the general rule among the mammaliæ to have a thyroid of two or three lobes. In vertebrates are always found accessory thyroids near the main gland. Van Bemmelen¹ has discovered in embryos epithelial derivatives behind the branchial clefts of the ventral aspect of the wall of the throat, which he has designated as "suprapericardial bodies." De Meuron has described homologous structures which he has observed in lizards, and which he has called *thyroides accessoires*, because of the similarity of the structure of the two bodies, and because these bodies become fused together in the mammalia by the central lobe. In mammals, besides the chief lateral lobes, many writers have described accessory lateral lobules. These structures evidently arise from the same source as the gland proper.

Histology.—The thyroid gland has in the beginning the character of a real gland, but which becomes lost. It is divided into lobules, by a connective-tissue frame-work, and is exceedingly rich in its blood-supply. In fishes and amphibians it contains large, bladder-like follicles lined with epithelium. Besides these, the thyroids of the higher vertebrates contain also cylindrical tubules which divide and subdivide, but which finally terminate in separate single alveoli. The mature gland of the mammal presents a convolution of circularly-enclosed glandular vesicles which are surrounded by a connective-tissue envelope and vascular net-work.

Wagner was the first to observe that after the extirpation of one lobe of the thyroid the other hypertrophied; and thereby this organ was demonstrated to respond to the same laws as govern other glandular structures.

In the same way have the experiments of Ribbert shown the analogy to other glands, in the regeneration of its parenchymatous elements, by a proliferation of the epithelium of the old alveoli and the formation of sprouts which grow into the connective-tissue, and there arrange themselves into small groups, secrete colloid material, and become changed into colloid-containing vessels lined with epithelium.

¹ Anatom. Anzeiger, 1889, No. 13.

Pathological Anatomy.—The subject of thyroid cachexia, since Horsley's work, has been advanced by the studies of Langerhans and his students.

The etiology of this affection, associated with degeneration of the thyroid, is still not well understood.

Myxœdema seems to be associated with an inflammatory process in the thyroid, which begins with a round-cell infiltration of the thyroid, and later results in a shrinking of the gland, which may be compared with cirrhosis of the liver. In a section of myxœdematous thyroid is seen the inflammatory infiltration. The acini seem farther apart than normal, and in some of the groups of inflammatory cells but a few epithelial cells can be seen representing the remains of acini. In some sections no sign of epithelium can be found. The vessels of the gland present greatly-thickened walls from endarteritic changes, and the smaller vessels become entirely obliterated. Atrophy of the epithelium is observed in the skin, the sebaceous follicles are enlarged, the hair-follicles are atrophic, and at their opening is usually found a broken and swollen hair. In the subcutaneous tissue, instead of the normal trabeculæ, are found only delicate fibrillar bundles, and the fat-cells are smaller than normal. Throughout the brain, liver, kidneys, lungs, and muscles are found connective-tissue growths associated with marked endarteritis and periarteritic changes.

The increased amount of mucin in the skin was first observed by Charles in such cachectic persons; and Halliburton has observed the same in apes after thyroidectomy.

But little has been accomplished in the study of goitre. Investigations which have been carried out in large numbers of cases lead to the conclusion that the condition of the soil is answerable for the occurrence of the disease. The only constant factor by which the soil is known to give rise to the disease is the drinking water. Kocher¹ found, by examining the school children of every family which used from common wells in the Lauterbrunnenthal region, that

¹ Deutsche Zeitschrift für Chirurgie; Festschrift für Professor Thiersch, 1892.

there were certain individuals without goitre, but that all of these persons who were not afflicted with the disease obtained their water from a certain well which the diseased persons did not use. The persons who confined themselves strictly to this well remained free from thyroid enlargement. St. Lager observed that the people in districts where rain-water was used did not contract the disease. It is not known what substance in the water causes goitre; nor have any particular geological conditions been definitely fixed upon as having an etiological bearing. The same kind of geological formation may in one place produce an abundance of the disease, and another place may be entirely free. Numerous observations have been made to show that it is not alone the mineral character of the locality, but much more the organic elements of the soil which are of etiological importance. Kocher has cited Humboldt as the first to classify goitre and cretinism among infectious diseases. Investigations have been made by Klebs, Bircher, and Tavel into the waters of goitrous regions to discover some organic cause for the disease. Tavel found in goitrous water thirty-three different varieties of organisms. The waters in the same region which did not produce goitre contained but nine kinds. It may be concluded from this that the particular waters which give rise to goitre are rich in organic matter. Lanz has made repeated inoculations from goitrous thyroids with negative results.

Horsley has presented the following observations as bearing upon the question of cachexia: Zesas observed that in cats and dogs the spleen became hypertrophied after removal of the thyroid. Sanguirico and Canalis observed in dogs marked anæmia and cerebral œdema, congestion of the mesenteric vessels, swelling of the liver, and in one case punctiform hæmorrhages of the intestine. Hyperæmia of the brain has been found by many observers. Albertoni and Tizzoni found degenerated islands in the peripheral nerves. Rogowitsch discovered a change characterized by destruction of the ganglion cells as a result of degeneration of the nuclei, vacuolization, degeneration of the protoplasm, and round-cell infiltration of the

tissue. He observed also a colloid degeneration of the cells of the hypophysis. Schwartz was not able to find these changes, but Löwen-thal observed the formation of vacuoles and atrophy of the large pyramidal cells in the cortical centres of the lower extremities of a dog.

Since these publications of Horsley, the following observations have been added to the literature :

Hofmeister did not find any vicarious hypertrophy of the spleen or thymus after thyreoidectomy in rabbits ; in fact, the spleen was invariably smaller than in the control animals and showed no microscopic changes. The hypophysis was invariably enlarged 50 or 100 per cent. as compared with the control animals of the same litter. Hofmeister is inclined to believe with Virchow that there is a physiological relation between the thyreoid and the hypophysis. The embryology of this relation has been shown by Dohrn ; and Rogowitsch and Stieda have made experimental demonstrations which corroborate his conclusions. Hofmeister found an increase in the size of the cells of that body. The same experiments showed a retarding of the development of the skeleton after thyreoidectomy. By exact comparative measurements of the operated and control animals from the same litter, a marked checking of the bony development was observed. The greatest differences were seen in the large long bones, the pelvis, and spinal vertebræ. The bones of the skull were the least retarded of any. There was always a marked retardation in the ossification of the epiphyseal line. These facts are in harmony with the observations in human pathology. True cretins are short in stature, and even in adults the epiphyses and synostoses are still cartilaginous, as has been shown by Dolega, Langerhans, and others. Bruns has published a case which, eighteen years before, had been subjected to thyreoidectomy, and which at the age of twenty-eight was not taller than a ten-year-old boy, the longitudinal growth of the body having remained stationary ever since the operation. Nauwerk, who had the opportunity of making an autopsy, found the epiphyseal lines in places still cartilaginous.

Hofmeister has found in the kidneys of such cases a peculiar change in the epithelium of the tubuli contorti. The ovaries are regularly the seat of a marked change, consisting in the simultaneous premature ripening of numerous follicles,—the follicular hypertrophy of Ziegler. The remaining organs, brain, cord, liver, stomach, intestine, suprarenal bodies, thymus, spleen, testicle, and epididymis, examined by Hofmeister, showed no changes. Another regular and striking change in the appearance of the animal, aside from its shortness, was the thickness and plumpness which it developed one month or six weeks after the operation. A less constant change was the coarseness of the hair, and the breaking off of the "feeling hairs" of the face.

Gley¹ showed that by simultaneous removal of both accessory thyroids the symptoms of acute cachexia developed. In chronic cases he observed the falling out of hair and the formation of nodular thickenings in the skin.

Christiani² experimented upon rats, and observed also an acute cachexia after the operation.

Von Eiselsberg³ made the same experiments upon sheep and goats as Hofmeister made upon rabbits.

Schönemann⁴ examined in 112 cases the condition of the pituitary body in cases in which the thyroid gland was in some manner degenerated. He came to the conclusion that there was no parallel between the weight of the thyroid and the hypophysis, nor was he able to observe any compensatory hypertrophy of the hypophysis in cases of carcinoma or struma of the thyroid. The histological examination of the pituitary body, however, showed that in struma thyreoidea there was very commonly certain changes in the former, which might not be regarded as compensatory or vicarious, but which occurred parallel with the degeneration of the thyroid.

¹ Comptes-rendus de la Société de Biologie, 1891, No. 37, Semaine médicale, 1892, No. 37, and Arch. de Physiologie.

² Arch. de Physiologie, 1893, No. 1.

³ Centralb. für path. Anat. und allg. Pathologie, 1893, S. 353.

⁴ Virchow's Archiv, Bd. 129, 1892. S. 310.

Boyce and Beadles report two cases of myxœdema and one of sporadic cretinism in which the enlarged hypophysis, in the absence or atrophic state of the thyreoid, was indeed shown to have assumed an increased activity of function.

The relation of the nervous system to cachexia thyreopriva has been described by Arthand and Magnon,¹ who have rehashed the old theory of Munk, and regarded the cachexia as due to a neuritis of the vagus nerve.

Langerhans and Kopp² have published two works upon the relation of the peripheral nervous system to the acute cachexia of the dog and to the more chronic cachexia of the ape and man, and its bearing upon cretinism. Langerhans found in the peripheral nerves, both in men and apes, after extirpation of the thyreoid, as well as in cretins, the following changes, sometimes single and sometimes combined, and involving both the trunks and the small muscular branches: (1) Thickening of the walls of the vessels, especially the capillaries; (2) dilatation of the lymph-spaces beneath the perineurium and in the endoneural connective tissue; (3) the appearance of peculiar cells, resembling œdematous cells of the endoneurium, and containing small vesicles (these cells were observed in the dilated lymph-channels); (4) patches of deposits of flat longitudinal fibrous bundles, associated with circumscribed dilatation of the peripheral lymph-channels, the latter containing the peculiar vacuolated cells; (5) isolated appearance of peculiar long spindles, having loose, concentric fibrous tissue about their periphery, and a centre of non-nucleated homogeneous material formed from the degenerated fibres.

Kopp found the ectasia of the lymph-spaces and the vesiculated cells in dogs.

Langerhans observes that the connection between these changes and the removal of the thyreoid or struma and cretinism have been seen by many investigators. Schultze and his student Trzebinsky have accurately described them. The latter found them in the brachial plexus in twenty-eight out of sixty-five cases.

¹ Comptes-rendus de la Soc. de Biol., 1891, No. 26.

² Virch. Arch., Bd. 128, 1892, S. 290, ff.

The central nervous system of a dog suffering from cachexia thyroidectomica was studied by Kopp, who found only a swelling of the axis cylinders.

Exact investigations of this point were made by De Quervain,¹ who examined the central nervous systems of an ape, cachectic dogs and cats, in connection with those of control animals. After passing the specimens through the various fixing, hardening, and staining processes, he came to the conclusion that, with the present known methods for studying nervous tissue, no constant changes could be found which could be positively declared as due to the disease of the thyroid.

Kent's reports of the discovery of constant bacilli and cocci in the tissue of cachectic animals, Lanz does not regard as worthy of discussion.

Function of the Thyroid.—Horsley has come to the conclusion that the best grounded of the theories concerning the function of the thyroid is that which claims that the organ destroys or changes certain substances which circulate in the blood, and which have a harmful influence upon the general system. He also adds that the thyroid secretes a substance which serves in the metabolism of the body.

As the metabolic process in cold-blooded animals is much slower than in the warm-blooded, Lanz has carried out a number of experiments by removing the thyroids of the former at the zoölogical station at Naples. He employed fishes, amphibians, and reptiles in the course of his experiments.

The amphioxus he found too small for satisfactory experimenting. Experiments were made with the ammocoetes, the larva of the petromyzon, in which the thyroid secretes externally and represents the transformation stage in which the organ becomes shut off from the throat cavity. The ammocoetes is such a delicate creature that none of the animals upon which he operated lived longer than thirty-six hours. The shark (*scyllium catulus* and *S. canicula*) was next tried. The removal of the thyroid from fifty sharks gave an almost completely negative result. They recovered quickly from the operation,

¹ Virch. Arch., Bd. 133, 1803.

and later on did not differ from the control fish, either in the swimming or general habits and appearance, though the shark responds very promptly to inoculation with tetanizing poisons. The total extirpation of the thyreoid and its accessory bodies diminished the strength and shortened the life of the sharks thus treated.

Bony fishes, which differ from the cartilaginous fishes in that they have no accessory thyreoids, do not survive the operation of thyreoidectomy.

Reptiles bear the operation well. Twelve lizards (*Iacerta viridis*) gave negative results. These animals possess suprapericardial bodies which cannot be removed.

One of the most important points in Horsley's work is his demonstration of the parallelism between the general nourishment and the results of removal of the thyreoid. According to Horsley the reaction runs parallel with the variations in the food which the animal takes. "Those animals are affected the most which subsist entirely upon flesh, and those which are entirely herbivorous suffer the least, while the omnivorous animals are affected in a middle degree between the two." This observation shows that the thyreoid really plays a part in the metabolism of the body, and that there is a definite chemico-vital basis upon which to work out its function.

Gley and Christiani have found that it makes a very great difference whether the chief gland alone is removed or the accessory glands with it. While the simple extirpation of the chief gland caused no acute symptoms, fourteen out of sixteen rabbits, upon which was done a total extirpation, including the glandulæ paraparotidæ, perished with acute cachexia. On the second day dyspnœa and muscular weakness appeared. This was followed by paralysis of the extensors, spasms, opisthotonos, difficulty in walking, rise of temperature, and death, usually within the first week from a tetanic attack.¹

Christiani² has performed a large number of thyreoidectomies upon rats, and has arrived at the following conclusions :

¹ Arch. de Physiol., 1892, p. 81; Ibid., 1892, p. 135; Ibid., 1892, p. 311.

² Revue médicale de la Suisse romande, 1892, No. 11; Arch. de Biol., Janv., 1893; Arch. de Physiol., 1893, No. 1.

(1) Total thyroidectomy causes death in the rat in the course of a few hours or after some days. Death is preceded by symptoms similar to those observed in other animals,—as the cat, for example,—muscular weakness, dyspnœa, stiffness of the extremities, and emaciation.

(2) In the many cases in which the animal survived, the excision was found not to be a total one, and the autopsy showed regenerated glandular elements.

(3) When the extirpated gland is implanted in the peritoneum the cachexia can be diminished, and the life of the animal preserved.

These fundamental principles have been demonstrated in the dog by Schiff, corroborated in the cat by Von Eiselsberg, and transferred to human pathology by Kocher, Bircher, and Horsley. Von Eiselsberg has made the demonstration that the thyroid can be transplanted upon the peritoneum, and between the fascia and peritoneum, where it continues to live without becoming absorbed. He demonstrated that the cat did not perish after a total thyroidectomy and such a transplantation, but the subsequent removal of the transplanted gland caused the development of a fatal cachexia; thus demonstrating that the gland had continued to perform its natural function in its new location.

Christiani has discovered accessory thyroids in the neck of the rat; and Wölfler has found in man embryonal glandular tissue on the periphery of the thyroid.

Out of fourteen rats operated upon by Lanz, for a special observation, thirteen died during the first two days after the operation with increasing difficulty in breathing, which Lanz is inclined to regard as due to a lesion of the *recurrens*, though he does not wish to contradict the conclusions of Christiani.

Since it has been demonstrated that rabbits and rats are especially susceptible, it is evident that the theory of Sanguirico and Orecchia, which has been elaborated by Horsley, that the food of the animal influences the outcome of thyroidectomy, does not hold with

all its original force. It is evident that the animals which have accessory thyroids, whether they be carnivorous or herbivorous, withstand the operation best.

It must not be lost sight of that in rabbits the most minute particle of gland-tissue remaining suffices to perform the function necessary for the life of the animal; while, according to Fuhr's experiments, the dog perishes if more than two-thirds of the organ is removed. The omnivorous man can get along with a much smaller amount of thyroid than this. It is a fact that certain articles of diet diminish the untoward symptoms after the operation. For example, a milk diet lessens the severity of the cachexia in dogs. Lanz assumes that the symptoms in cold-blooded animals are much less acute because of the slowness of their metabolism.

Vicarious Organs.—Since Zesas claimed that a compensatory hypertrophy of the spleen occurred after removal of the thyroid, the idea has been much discussed. Albertoni and Tizzoni, and more recently Gley, have positively shown that the spleen has no vicarious function after extirpation of the thyroid, and that the cachexia in an animal without a spleen did not appear any sooner than in a normal animal. Hofmeister found by his experiments on rabbits that the spleen and thymus were lighter after thyroidectomy than in the control animals. De Quervain has observed the spleen in cases of cachexia thyreopriva, and has concluded that the spleen has no vicarious action in these cases. Besides this he has made the autopsy upon five persons dying of cachexia thyreoidectomica, and in four the size of the spleen was less than normal, in the fifth case it was normal.

Lanz did not see in any case an enlargement of the spleen, neither among his sharks nor thirty dogs operated upon, nor any of the animals with which he experimented.

Virchow has, contrary to the earlier view which held that the spleen, the thymus, and the thyroid were analogous, declared that there is a parallelism between the tissue of the thyroid, the cortical layer of the suprarenal capsule, and the hypophysis cerebri. In his

teaching he has claimed that there are certain forms of tumors arising from these different tissues, and which he has designated as strumas,—struma suprarenalis, struma pituitaria.

Schiff has not been able to concur with the hypothesis that the suprarenal capsule can act vicariously for the thyroid.

The changes in the hypophysis after thyroidectomy were first observed by Rogowitsch.¹ He regarded the hypertrophy of the glandular portion of that body as due to an increase of functional activity. Streda² corroborated the observation of Rogowitsch. He invariably found enlargement of the hypophysis with enlargement and vacuole-formation in its parenchymatous cells. Neither of these observers noticed an increase in the formation of colloid material. Hofmeister observed in his rabbits an enlargement of the hypophysis, and a widening of the sella turcica. But few observations in man are recorded. The "myxœdema commission" found five cases of myxœdema without changes in the pituitary body. Bournville and Bricon³ saw an hypertrophic hypophysis in a case of sporadic cretinism with absence of the thyroid. Dolega⁴ observed at the autopsy upon a cretin that the sella turcica was unusually long and deep, which he evidently erroneously attributed to a defective skull-formation.

The studies of the pituitary body in its relation to the thyroid have not been productive of any very definite knowledge. The observations upon dogs have been unsatisfactory, for the reason that the animals have died so soon after the thyroidectomy that the changes in the hypophysis could be observed only in their initial stages. Gley, Vassale, and Sacchi have attempted the removal of the latter body with poor success. Lanz implanted eight hypophyses during the course of several months in the peritoneum, in the tunica vaginalis testis, beneath the skin and peritoneum of a dog, and then removed the thyroid. The cachexia ran its usual course, and the

¹ Ziegler's Beiträge, Bd. VI.

² Ziegler's Beiträge, Bd. VII.

³ Archive de Névrologie, 1886.

⁴ Ziegler's Beiträge, Bd. X.

autopsy showed that all of the transplanted tissue had been absorbed. And so the relation between these two organs remains to be elucidated. That there is a relation may be inferred from their embryology. Dohrn has shown that the pituitary body is formed from the ectoderm, and he has observed in the same the remains of a branchial cleft. He has further shown that this gland in the petromyzon never becomes separated from the opening in which it is formed. It is thus checked in its development just as is the thyroid gland of the same animal, of which it is unquestionably an analogue.

Marie and Marinesco have called attention to the relation between the thyroid and acromegaly. Sousa-Seithe has concluded on the ground of his study of acromegaly that atrophy of the thyroid is more common than hypertrophy in that disease. According to him the only constant pathologico-anatomical change in acromegaly is a marked enlargement of the hypophysis. It is not impossible that the hypophysis possesses a function similar to that of the thyroid, so that acromegaly—analogue to the myxoedema of cachexia thyreopriva—may be regarded as a cachexia pituitaria resulting from struma pituitaria.

The rôle of the thymus gland and its relation to the thyroid is unknown. Marie has recently observed that the thymus is found hypertrophied in congenital myxoedema. In myxoedema in the adult, where the thymus should be greatly atrophied, it is found well developed. He has called attention to the persistence of the gland in acromegaly, and cites five cases of Basedow's disease, in all of which the thymus was enlarged.

There is a much closer relation between the thyroid and the accessory thyroid bodies than with any of these other structures, as Gley and Christiani have shown. Sandström and Gley have found that in rabbits these lateral thyroid bodies are not connected with the gland proper. Christiani has found that this is not the case with other rodents. In the rat these bodies are enclosed within the thyroid gland, but differ from the gland in that they still retain their embryonal structure and are separated from it by a sort of con-

nective tissue capsule. In the mouse they show a tendency to separation, but are attached by one pole to the main gland; and in one variety (*arvicola arvalis*) this union exists only on the right side, while the left has no attachment to the central body. According to Gley's observations removal of the accessory bodies without the gland proper or removal of the latter without the former causes no cachexia. The extirpation of both structures was fatal, whether the operation was done in one or two stages. The removal of everything but one accessory thyroid did not cause the death of the animal. The very small remaining nodule increased in size till at the end of one or two months it was double its original size and had acquired the structure of the adult thyroid gland.

The Influence of the Food upon Thyroid Cachexia.—Breisacher explains the fact that a milk diet lessens the cachexia by assuming that thereby the animal is kept in a state of imperfect nourishment. Lanz claims that poorly-nourished animals withstand the cachexia better than those that are well fed. The experiments of Munk and Fuhr have shown that the onset of the tetanic symptoms often follows the ingestion of animal food, and that under a milk diet the percentage of dogs which survive the operation is greatly increased. One-third or even a fifth of a lobe of the thyroid, if left, suffices to prevent the cachexia in milk-fed dogs.

The Influence of Temperature.—Horsley found that by elevating the temperature, apes, after thyroidectomy, could be kept alive 125 days; whereas in the ordinary room temperature they survived but twenty-four days. It has been observed that the human subject does much better in the warm hospital ward,—a fact which has been made use of in Kocher's clinic in a practical way.

Lanz has seen in short-haired dogs confined in cages so small as to prevent much movement, and in those which were not well dried after the operation, muscular convulsions similar to the initial spasms of tetany. He has seen similar convulsive movements in dogs which had been paralyzed by division of the spinal cord, and probably due to an inhibition of the heat-producing function. The chief source

of the animal heat is in the muscles, and a "chill," caused by a more or less general muscular convulsion, has the tendency to elevate the bodily temperature. These convulsive movements alternating with polypnoea are the natural way of regulating the temperature in these animals. When they are kept in an atmosphere of high temperature the convulsions are much less marked.

The anatomical seat of tetany or the source of the muscular spasm has been investigated in Horsley's laboratory in London. In the first experiments the ischiatic nerve was divided either before the thyreoidectomy or after the spasms had begun. This prevented, in the four dogs thus operated upon, any spasms in the muscles supplied by the divided nerve; therefore, they were not of peripheral origin.

In order to find the relation of the spinal cord to this symptom, the cord was divided at the eighth dorsal vertebra in six animals. Five of these dogs were operated upon by thyreoidectomy either before or after this procedure, and one was reserved as a control animal. A sort of convulsive movement was observed in the hind legs of these animals, but altogether different from that which occurred in the front legs. Inasmuch as this same thing took place in the hind legs of the control animal, it was regarded as due to the spinal lesion. The cord of one dog was not divided till a convulsive action had begun in the hind legs, which ceased immediately on the division of the cord.

A third series of experiments were made upon five dogs. From these the motor area of one hemisphere was removed either before or after the thyreoidectomy. The thyreoid was left in one animal. In these cases the convulsions were more pronounced upon the corresponding side than upon the sound side. It was observed in two dogs that within two weeks after the cortical excision the symptoms of paralysis had entirely subsided, but immediately after the thyreoidectomy the paralysis reappeared and continued until the animal died of cachexia. Similar results were obtained by destroying the motor tracts of both hemispheres.

The cerebral nature of the cachectic changes is evidenced by the

circumstance that shouting or otherwise exciting the psychic centres of the animal gives rise to muscular spasms. Furthermore, the initial restlessness and the subsequent apathy and stupidity of the animal, like the characteristic slowness of speech and impairment of intellect observed in man, must be due to cerebral disturbance.

A final series of experiments was performed by removing one hemisphere of the cerebellum. The spasms were greatly increased in the corresponding side of the body.

From these experiments it may be concluded that the tetania thyreopriva originates in the cord, but is influenced by the higher centres. Other bulbar symptoms appear in the course of these tetanic attacks, as dysphagia and vomiting; and death is probably due to a bulbar lesion,—*i.e.*, paralysis of the respiratory centres.

The clinical symptoms of the cachexia, as observed in the dog by Schiff, in the rabbit and rat by Gley and Christiani, in the cat by Von Eiselsberg, in the ape by Horsley, and in man by Kocher, represent all of our present knowledge upon the subject. Lanz adds that two dogs upon which he operated antiseptically died with much more acute symptoms than any upon which he operated aseptically.

Animals without thyroids do not stand the narcosis as well as normal animals. Normal animals can always be resuscitated by artificial respiration, but these animals refuse to respond.

The symptomatology involves nervous disturbances of the (1) circulation; (2) respiration; (3) digestion; and (4) uro-genital functions.

There is a very pronounced diminution of the blood-pressure. Lanz found the blood-pressure in a dog to be 195 millimetres before the operation. After removal of the thyroid it sank to 175 millimetres on the second day and to 135 millimetres on the sixth day. The pulse-curve showed no marked change except an increase in the frequency.

Leucocytosis and great increase in the number of blood-plaques were also often observed in cachectic dogs. De Quervain has counted the red blood-cells, and always found a diminution of about 25 per cent. in their number.

Albertoni and Tizzoni and Herzen have found a diminution in the oxygen and an increased vensity of the arterial blood; and the two former have concluded that the thyroid has the function of fixing the oxygen in the red corpuscles. Vassale,¹ assuming that the red cells lost their oxygen-assimilating power after removal of the thyroid, sought to restore it by injecting thyroid extract into the circulation. In order to get at the process of oxidation more closely, Lanz made use of the methyl-blue experiment of Ehrlich. Three dogs without thyroids and two normal dogs were killed with methyl-blue. The white blood-cells of the latter were much more stained than the former. The nuclei were very deeply stained, whereas in the former the white cells were not stained at all or had but a slight diffused stain.

Disturbances of respiration are always more or less marked. This is especially noticeable during the tetanic attacks in which the breathing becomes very rapid.

The digestive disorders are manifested by difficulty in swallowing, anorexia, and vomiting. The animal acts as though it were hungry and would like to eat, but fears the consequences of indulgence. The intestine is found at the autopsy to be dry and narrow.

Falkenberg reported to the German Congress for Internal Medicine, in 1891, the very frequent occurrence of sugar in the urine of dogs after thyroidectomy. Neither this nor albuminuria are constant symptoms, and are probably of no specific importance.

The pronounced impairment of the genital functions in cretinism and cachexia thyreopriva is well known. Freund has studied for many years the relation of the thyroid to the organs of generation, and has found that in cases of fibroma of the uterus and pregnancy the thyroid becomes enlarged, and that labor causes a still greater enlargement, which disappears after twelve or twenty-four hours. The organ again becomes enlarged during lactation.

The elder Freund looked upon atrophy of the genitals as an etiological factor in Basedow's disease.

¹ *Centralb. für med. Wissensch.*, 1891, No. 1.

Lanz found that the spermatic fluid of a dog, very rich in active spermatozoa immediately before the operation, contained no movable sperms immediately after death.

Therapy of Thyroid Cachexia.—St. Langer collected observations showing that boiling or decanting water removed the exciting cause of goitre. This points to the organic nature of the poison, and teaches that the well should be thoroughly protected from such pollution or should be closed and water brought from some other source. Where this is not possible reservoirs or cisterns should be employed, or the water should be boiled or filtered. On the other hand, since the disease destroys the function of the thyroid, a right-sided goitre operation may be performed. In Dieffenbach's time the operation for goitre was not allowed. Velpeau and the Société de Chirurgie strongly condemned Roux for removing a goitrous thyroid. These cases represent another surgical period. Kocher, having performed many hundreds of operations for goitre, declares the operation to be thoroughly safe. The demonstration that the total extirpation of the thyroid gland is an unjustifiable operation has become an established law through the publications of Kocher and Reverdin.

Schiff's discovery that the injection into the circulation of thyroid extract suffices to protect the animal from the cachexia thyreopriva has been successfully applied to man.

Kocher, in 1883, transplanted a piece of thyroid beneath the skin, but observed that in the course of time it atrophied and disappeared. Bircher succeeded in improving a case of operative cachexia by thyroid implantation. Encouraged by this, Kocher transplanted into the abdomen and beneath the peritoneum, but only obtained a temporary improvement. He also, in a case of cachexia thyreopriva and in a case of spontaneous cretinism (as a result of absence of the thyroid), planted a freshly incised canine thyroid in the tunica vaginalis testis and introduced a bit in the circulation in the femoral artery. The first case for a time was much improved; the second experiment was without result.

The implanted gland in these cases did not become permanently

fixed, but was absorbed, and the therapeutic influence lasted only while the gland remained.

When the cause of the disease, the absence of the thyreoid, persists, its secretion must be supplied. At the last meeting of the British Medical Association, Horsley made the announcement that treatment would be more successful if the patients were first fed upon thyreoid gland and then grafted with fresh glandular tissue, in that the myxœdematous condition of the tissue would thereby be diminished and the transplanted material would more probably take root.

Murray and Howitz have found that in the non-operative cachexia (myxœdema) the patient's condition could be greatly improved by the injection of thyreoid extract.

Day by day reports of such cases come from England. The patients gain in flesh and strength, the myxœdematous swellings subside, and the stiffness, malaise, and apathy improve. The amount of urine increases, and much more urea is excreted.

Great caution is necessary in the injection of organic substances, because of the importance of their sterility. Cooked thyreoid fed by mouth still has a therapeutic action. This "substitution therapy," which has been found of unquestionable avail in disease of the thyreoid, may also be applied to other organs. The principle of its wide application was introduced into medicine by Brown-Séquard, in 1869, with the claim that all glands, with and without ducts, supplied some important substance to the blood.

The discovery of pancreas diabetes by V. Mering and Minkowsky supports the claim of Brown-Séquard of an "internal secretion" of the various glands; and Lanz holds it possible that other than glandular organs, besides their chief function, may possess other specific peculiarities of which we do not know; as, for example, that might explain Marie's "ostéo-arthropathie hypertrophiante d'origine pneumique." Brown-Séquard demonstrated that the kidney had another function than the excretion of urea by prolonging the lives of animals after double nephrectomy by injections of kidney extract. Similar experiments have been made with the spleen by Schiff and

Herzen. So with the liver: besides its digestive function by the agency of the gall, it plays a very important rôle in the metabolism of sugar and urea.

The pancreas and suprarenal capsules show a very close analogy to the thyroid gland. Diabetes does not occur if a small portion of the pancreas is left remaining. Whether the implantation of a bit of pancreas will exercise a curative effect upon diabetes is an experiment greatly to be desired.

Though it is possible that Brown-Séquard has placed too high a value upon the "liquide orchitique," still the experiences with the thyroid tend to corroborate his philosophy. Like the thyroid, removal of the testicle causes a specific cachexia, characterized by changes in the voice, imperfect growth of the hair, and a series of psychical changes.

The theory of Mendel that the loss of weight, and the increased amount of urea eliminated during the administration of thyroid, will point to an increase of metabolism. In consideration that the absence of the thyroid probably causes disturbances of the albuminous digestion,—*i.e.*, disturbances of the consumption of the tissue albumen,—it is certainly not unjustifiable to make careful experiments with thyroid juice in other affections due to a diminution in the bodily metabolism. Anomalies in the disintegration of albumen, as, for example, adiposity, ~~an~~æmia, gout, and other constitutional diseases, might be amenable to such treatment. Infantile tetany in the majority of cases is closely associated with rachitis; and respiratory spasms, convulsions, and other nervous disturbances are often observed in rachitis. Lanz would treat acromegaly with pituitary gland.

It has been observed by English physicians that the administration of thyroid gland to healthy men, or the administration of too large doses in myxœdema, causes acceleration of the pulse, excitement, and dizziness. These facts throw some light upon the nervous manifestations in Basedow's disease, as being due to an exaggerated functional operation of the thyroid gland.

Mendel found at the autopsy upon a case of morbus Basedowii that the left corpus restiforme was atrophic, and that there was also an atrophy of the solitary fasciculus on the right side. This observation is of importance, because the removal or incision of the corpora restiforma, practised by various experimenters upon the dog and rabbit, caused the appearance of Basedow's symptoms. On account of the relation of these pathological changes to the vagus centres, Mendel has regarded them as a physiological ground for locating the origin of the disease at this point. White found a case of Basedow's disease with hæmorrhage into the medulla, extending into the corpus restiforme. Contrary to these observations, Kocher and Möbius regard the disease as one primarily of the thyroid. How otherwise can the numerous cures of the disease (Kocher, Lernke, Schnirer) by thyreoidectomy be accounted for, and the observation of Reynolds, that out of forty-eight cases but one occurred in a male? This corresponds with the sexual distribution of goitre on one side, and myx-œdema on the other side.

Lanz's experiments upon himself do not confirm the experiences of the English physicians. He has frequently eaten fresh thyroids, at one time as many as four at a sitting, without observing any quickening of the heart's action.

Before summing up the thyroid question, a few examples may be cited from recent experiments to show its similarity to other organs.

Albanese has experimented with the suprarenal capsules in the laboratory of Mosso, and found that these organs have as their function the metamorphosis of toxic substances. Abelous and Langlois have found that in the summer time, when their function is greatly increased, the destruction of the capsules in the frog causes death in the first forty-eight hours, while in the winter the animals survive the operation thirteen days. If winter frogs are kept at a temperature of 22° C. after the operation, they live but three days instead of thirteen. Death is preceded by a constantly-increasing paralysis, which comes on much more rapidly when the animal is kept in motion. If one

capsule and the larger part of the other are removed, the animal does not die.

Mering and Minkowsky have explained pancreatic diabetes by the theory that the pancreas supplies to the blood a substance which serves in the general metabolism by breaking up the carbohydrates. Lépine assumes that this substance is a ferment which acts upon sugar; that the pancreas produces a glycolytic ferment. He has observed that in diabetic blood the glycolytic ferment is diminished. Chvostek has found that in Basedow's disease the power of assimilating grape sugar is diminished.

The investigations of Schiff have shown that the liver protects the system from various poisons. It removes from the portal blood most of the alkaloids, copper salts, etc., but allows potash salts and other poisons to pass. Schröder has shown that the liver is the chief organ in which urea is formed; and Hahn, Massen, Nencki, and Pawlow have, by making the portal vein to empty into the inferior vena cava and thus diverting the liver circulation, found that animals so treated eliminate much more ammonia than normal, and that in the form of carbamic acid. Dreschel has shown that the oxidation of all organic nitrogenous compounds always results in the formation of carbamic acid; and that the liver is the organ in which this carbamic acid is converted into urea. The liver is not the only place where these changes occur, for the urine of dogs whose livers have been removed or the circulation of which has been shunted off is not free from urea. The symptoms in animals after such an operation are respiratory disturbances, psychical changes, somnolence, general weakness, clonic and tonic convulsions, coma, and death. These symptoms begin on the tenth day after the operation. Animals which do not eat flesh recover.

Considerable light is thrown upon the function of the thyroid by the consideration of the cachexia thyreoidea, the "substitution therapy," the recent experimental studies of the functions of other glandular organs, and the limited chemical investigations.

One who has seen but once the acute form of cachexia thyreo-

priva in the dog cannot help believing that the removal of the thyreoid caused an acute intoxication in the animal. The emaciation of the animal is so rapid that it must not only be due to a diminution in the amount of food taken or assimilated, but to an increase of metabolism above the normal.

The differences in the symptoms of the more latent course of the cachexia in man, compared with the experimental tetany in animals, are partly due to the fact that in man the diseased gland is removed, and that during the period of the disease other organs have had time to gradually assume the function of the degenerating thyreoid. This chronic cachexia has been produced in apes by Horsley, in dogs by numerous experimenters, in rabbits by Hofmeister and Gley. The acute form has also been observed in man. Von Eiselsberg has reported twelve cases of tetany among the fifty-two total excisions of the thyreoid in Billroth's clinic; while among the 115 cases of partial excision tetany did not once occur.

A similarity is evident between the genuine tetany of man and the thyreoid tetany in the symptoms of œdema and trophic disturbances of the skin, hair, and nails. As an etiological factor in the true tetany are observed chiefly disturbance of digestion, as occur in gastro-intestinal affections. Ewald has reported a case in this line. The patient, who often suffered from attacks of tetany, could foretell such an onset, for always when after diarrhœa the stools became more consistent an attack occurred; and as soon as diarrhœa again developed the tetany disappeared. This can be simply explained by auto-intoxication, due to improper decomposition of the food. It is analogous to the eclampsia and convulsions of children due to digestive disturbances.

Since Schiff declared that the function of the thyreoid has no connection with its anatomical situation, many experiments to corroborate his views have been made. Fano and Zanda have repeated Munk's experiment of isolating the gland and ligating its vessels, with the unexpected result that the animals died of cachexia. These same authors have, on the other hand, disproved the hypothesis of Alber-

toni and Tizzoni that the thyroid renders the red blood-cells capable of retaining oxygen, for they found that by diminishing the latter no symptoms of cachexia were produced. The question whether the gland supplies some material which is essential for nourishment in the animal economy, or whether it destroys certain poisonous materials in the blood, has been decided by Schiff in favor of the latter.

The following facts corroborate this view: Colzi transfused cachectic dogs with blood from healthy dogs, and observed that the animals acted perfectly normally for two or three days thereafter, and then relapsed into their abnormal state. Fano, Zanda, and Rogowitzsch have found by transfusion of blood and salt solution from normal to cachectic animals and *vice versa* that, in the first instance, improvement of the tetanic symptoms followed, and in the last a rapid increase of the symptoms resulted. Alonzo and Laulanié¹ have found an increase in the virulence of the urine after thyroidectomy. Excepting in cases of temporary suppression of the tetanic attacks by the injection of thyroid juice, Gley and Alonzo have observed that the poisonous properties of the urine of dogs after thyroidectomy is much greater than the normal, and is especially marked on the second or third day after the first appearance of the symptoms. A toxic material, therefore, enters the urine after removal of the thyroid. Gley has shown that this material circulates in the blood by injecting the blood-serum of these animals, and producing spasms which cannot be produced by the injection of normal serum. Breisacher fed his dogs alternately with milk, raw meat, cooked meat, and bouillon. Under a diet of milk and cooked meat the tetanic symptoms were least marked. The raw meat and bouillon caused an increase in the symptoms. When the operation was done in two stages, the animals died much quicker under a meat diet than under a milk diet. It is evident that the substances in meat which give rise to the toxine are soluble in water.

When we now come to study the working of the poison which is thus eliminated by the glandula thyreoidea, it is evident that it must

¹ Comptes rendus de la Soc. de Biolog., 1891, 43.

be a so-called "nervous poison," and that the conclusions of Schiff and Horsley have been well grounded.

Abelous and Langlois have found by experiment that the toxic principle in the blood of the animal, after removal of the suprarenal capsules, acts on the motor-nerve endings very much like curare; and Lanz elicited from his animals by percussing the chest attacks resembling those of strychnine-poisoning. The itching of the skin, of which the animals after thyroidectomy often suffered, seemed to be analogous to that in jaundice due to cholæmia.

The results of therapy still add something to our knowledge of the function of the thyreoid. The circumstance that the exhibition of pilocarpine causes an improvement in myxœdema is doubtless due to the elimination of toxic materials through the increased perspiration and salivation.

When the field of physiological chemistry is explored for information as to the function of the thyreoid, the following facts are found:

It is possible for abnormal albuminous decomposition to take place in the intestine, which causes an auto-intoxication indicated by the presence of indican in the urine.

The symptoms of oxaluria are weakness and mental debility, which, according to Centani, are cured by a steady diet of meat.

In our bodies is lecithin, which contains cholin, an entirely harmless substance, but which by the extraction of a molecule of water is converted into neurin, a poisonous compound; and which by the loss of still more water becomes changed into cadaverin and putrein, two exceedingly poisonous substances. Normally, however, cholin is broken up into non-poisonous compounds.

Araki has observed that well-fed animals which are kept in an atmosphere poor in oxygen develop lactic acid, glycose, and albumen in the urine. If the animal is kept hungry, the glycose is not present with the other two substances.

The presence of lactic acid in the muscles in *rigor mortis* and tetanus explains the hypothesis of Marcuse that in muscles an unknown albuminous body exists, from which lactic acid is formed

during normal activity or by the death spasm, either directly or through the intermediary formation of glucose.

Colasanti and Moscatelli have found paralactic acid in the urine of soldiers after long marches.

As a chemical ingredient of the thyroid gland Bubnow found no mucin in the watery extract, but it gave the reaction of albumen, besides which were also present cretinin, hypoxanthin, guanin, and lactic acid, all of which were qualitatively determined. The lactic acid has been repeatedly found in the form of paralactic acid.

Horsley has, on the ground of the increased amount of mucin in the tissues of cases of thyreopriva, regarded the thyroid as the seat of the metamorphosis of mucinoid substances; and Rogowitsch has drawn a parallel between myxœdema and amyloid degeneration, which is caused by the formation in the blood of some unknown poisonous substance which finds its way into the blood as a result of chronic suppuration.

In his elaborate treatise, Lanz has thus summed up the thyroid question. There is much material for speculation in the analogy between the function of this gland and that of many other organs of the body, the accurate determination of which rest largely with physiological chemistry. It is certain that the surgery of the thyroid has witnessed marked changes in the last two decades; and the vast amount of material in this line which has been accessible to Kocher has made his name especially prominent in this particular field of surgery.

JAMES P. WARBASSE.

THORBURN ON THE SURGERY OF THE SPINAL CORD AND ITS APPENDAGES.¹

THE author begins by discussing the propriety of the use of the term "laminectomy." Though acknowledging its bastard derivation,

¹ Abstract of lectures delivered before the Royal College of Surgeons of England, by William Thorburn, M.D., F.R.C.S., of Manchester, *British Medical Journal*, June 23 and 30, 1894.

nevertheless, since he finds it explicit, convenient, and already in general use, he proposes to use it himself.

As to the statistics of the operation of laminectomy which have been published, he finds them difficult of interpretation in detail, owing to the impossibility of differentiating between results due to the operation and to the conditions for which the operation was done. It is evident, however, that they show an improvement in results, attributable partly to improvements in surgical methods, and partly to a more judicious selection of cases. In operations for tuberculosis the mortality has been about 20 per cent.

The cause of death in these selected cases is important, and in the very great majority we find it to have been shock. Septic troubles are practically absent, and hæmorrhage, formerly so much feared, is rarely serious. This fact is again an encouraging one, as it is by no means impossible that an increasing experience and perhaps an improved *technique* may lessen the one serious risk,—that of shock.

Penetrating Wounds of the Spinal Cord.—He has collected and analyzed 40 published records of mostly stabs with the sword, bayonet, knife, or chisel.

In all these cases the meninges were certainly wounded by an instrument which was probably septic, and in spite of this, in 38 cases in which the result is stated there were only 15 deaths, of which 9 only were due to septic infection. The usual form of septic disease has been a rapidly-spreading meningitis, which in 2 of the cases extended to the cranial meninges, whereas in 1 case only was death due to a localized meningo-myelitis. Under these circumstances we can hardly regard the spinal meninges as peculiarly liable to septic inflammation. Again, there are 9 of the 40 cases in which there is a clear account of the discharge from the wound of cerebro-spinal fluid, which discharge was often profuse and prolonged, but this result gave no trouble save in one case, reported by Walshe, in which there ensued severe retching, readily arrested by closure of the wound, the patient making a good recovery. This being the case, it would appear to be good practice, in case of injury, or suspected injury, of

the meninges, which is likely to be septic, to leave the wound open, and thus to allow of the escape of such discharges as may form.

The most important point, however, with regard to these penetrating wounds of the spinal cord is the question of recovery of function after such a lesion, indicating as it would the power of repair of the human spinal cord. Of the 40 cases collected, 5 may be neglected, as there was evidence of injury of the meninges only, and 1, that recorded by Parmentier, appears to be an example of section of the cauda equina. This leaves 34 cases in which either the cord or the lower end of the medulla oblongata was wholly or partially divided. Many of these cases showed at first paraplegic symptoms, which rapidly cleared up to some extent, leaving as the more permanent or typical condition a spinal hemiplegia. Thus they are not only excellent examples of the so-called Brown-Séquard's paralysis, but they illustrate the readiness with which the minor compression lesion of the uncut side of the cord clears up, the one side being subject, no doubt, to the destroying lesion of section, the other to the mere pressure of hæmorrhage.

Of the 34 cases comparatively few died, there being 21 non-fatal examples in which the ultimate result is recorded. In these 21 cases the opportunities for recovery of structure and of function were the best possible. It is obvious that there can have been no great separation of the cut surfaces,—nothing, probably, beyond a slight layer of clot,—no persistent compression of any kind, and no septic infection. Despite these most favorable conditions, complete recovery of function occurred in but 3 cases; 16 had certainly persistent paralysis or anæsthesia, or both; and 2 were said to be improving when lost sight of. Further, of the numerous cases with permanent symptoms, very few showed any amelioration of the earliest condition. These facts appear to point strongly to there being little power of recovery of function after a destroying lesion of the human spinal cord, and although in a few cases such recovery was certainly satisfactory, these are so few and so opposed to the general rule that we can hardly suppose that the original injury was of any serious extent.

In man we cannot hope for anatomical recovery. Vicarious conduction may allow of restoration of function to some extent, but in the case of complete transverse lesions, in which vicarious conduction is manifestly impossible, no recovery whatever will take place.

These remarks apply to the spinal cord only. It is quite otherwise with its nerve-roots after they have left its structure. These roots are now simply peripheral nerves, and nothing is more certain than that such nerves are capable of repair after section. Hence we may anticipate recovery of the nerve-roots when divided within the vertebral canal. The importance of this distinction between the cord itself and its nerve-roots arises only in the cauda equina, where we have only roots to deal with, and here we may expect a natural recovery if the ends be not too far separated, or if no mechanical obstacle intervene; and, failing this, we may hopefully cut down upon and suture these roots, as we should do in the case of any peripheral nerve.

Fractures and Dislocations.—In compound fractures, which are chiefly gunshot wounds, and are, therefore, rare in civil life, there can be no question of the advisability of removing all splinters and foreign bodies. No new danger of any kind is introduced by such an operation, which is merely of the nature of "wound toilet," and numerous cases illustrate the benefits which may be derived therefrom. Fractures of the transverse and articular processes are also of little interest from the present point of view. They are very rare, being due only to direct injuries, such as gunshot wounds, and they do not involve the contents of the vertebral canal.

Fractures of the spinous processes alone are also rare. In such a case the removal of the depressed spinous process would be a simple operation, and one which should certainly be adopted, but as yet no operation of this nature has been recorded.

Fractures of the laminae are more important, and have always been regarded as suitable cases for surgical operation, although they also are by no means common. Thorburn analyzed 10 published

cases, in which the diagnosis was not open to question, and they lead to the following conclusions:

(1) The cause of this injury has generally been stated to be direct violence to the spine, but in 4 of these 10 cases there was certainly no direct violence, and in only 3 is such distinctly described. Further, the frequency of this injury in conjunction with a fracture of the bodies indicates a similarity in the mechanism of their production.

(2) The symptoms of fracture of the laminae are by no means definite, and the only case in which we can be satisfied that the diagnosis was made before death owed its detection to the distinct lateral mobility of a spinous process.

(3) The diagnosis is therefore difficult, and probably we can rely only on the following points: (*a*) The cause, if there be a clear history of direct violence; (*b*) the abnormal contour of the spine, and the presence of lateral mobility of one or more of the spinous processes, in conjunction with an obvious lesion of the spinal cord.

The treatment of these cases is very clearly indicated. We can hardly hesitate to perform laminectomy in such a case if there be any symptoms of pressure upon the cord. There is here no reason to anticipate a rebound of the bony fragment, such as that which we find in the case of fracture-dislocation of the bodies of the vertebrae. Then, again, the fragment is liable to be driven further inward upon the cord, and to be moved about so as to plough up the soft structures beneath it. There is also at least a reasonable probability that the medullary lesion is not a complete crush, but merely a more or less severe pressure. Lastly, the operation itself is in such a case of the simplest. In spite of this clear indication, which is generally accepted, Thorburn has found but 3 recorded operations in cases of this nature. The first, that of Péan, is briefly recorded, but appears to have been highly successful. The second, that of Mr. Allingham, was less satisfactory. The third case, reported by Schede, was one of complete paraplegia and anæsthesia with paralysis of the bladder and rectum. Sixteen hours after the accident the sixth dorsal arch was removed, and was found to have been broken off and depressed so as

to press upon the theca. The patient made a steady recovery, and eighteen months after the operation he could walk for long distances without even requiring the assistance of a stick.

Of the far more common and more serious lesions of the bodies of the vertebræ, fractures and dislocations may be spoken of together as fracture-dislocations; the commonest injury being a distinct luxation with but slight injury to bone.

It is only in unilateral dislocations that these injuries present any special peculiarities, but the latter undoubtedly form a distinct class of injuries. Their essential peculiarity is that, owing to the fact that but one articular process is displaced, there is often either no injury to the cord whatever, or such injury, if present, is but slight; and again, reduction is frequently possible and successful.

The true dislocations are almost always forward and downward. Indeed, the direction of this displacement is so common that all other forms may be regarded as pathological curiosities. In association with this lesion we may, however, note that it is probably not very rare to meet with diastases,—that is to say, with dislocation in which the displaced bones have recoiled, so as to leave no permanent disturbance of their relations. In cases of this nature, despite the temporary displacement, the cord may be seriously injured.

Fractures, on the other hand, may be oblique, transverse, or vertical; but they are by far most commonly oblique, from behind and above downward and forward, and, even if the broken vertebræ be comminuted, the tendency to this obliquity of direction still remains.

Analogous to the distinction between a true dislocation and a diastasis is the distinction between those fractures in which the bony displacement remains and those in which it is succeeded by the recoil of the vertebræ, due either to the falling back of the head or to the elasticity of muscles and ligaments, and the question as to the relative frequency of such recoil has been much discussed.

Of specimens in the author's possession, in the cervical region there are 12 cases in which there is no permanent displacement and

6 in which there is such displacement, thus giving a two to one majority in favor of temporary compression of the cord. In the lumbar region, on the other hand, in the whole of 10 cases there is more or less permanent displacement of the injured vertebræ, but it is by no means certain that the amount of this displacement was sufficient to cause serious pressure upon the spinal cord.

It is, however, to be remembered that the cases of permanent displacement or of permanent pressure upon the cord, are naturally more serious than those of temporary crushing, and that, therefore, they will appear in greater number among pathological preparations. This is probably the reason for the universal presence of permanent compression in lumbar cases, inasmuch as only the worst of these cases come under the hands of the pathologist.

Nature of Injury to the Cord.—(1) By far most commonly there is approximation of the laminæ of the vertebræ above to the body of that below, causing crushing of the cord. Such crushing may be associated on the one hand with permanent pressure, as in true dislocation and in fractures which do not recoil; or, on the other, with temporary compression, as in diastases and in fractures which do recoil.

(2) A fragment of bone may be driven back upon the spinal cord, but such a condition is exceedingly rare.

(3) Equally rare, if not more so, is a condition in which an intervertebral disk is, as it were, squeezed out from between the adjacent bones, so as to form a projecting shelf which compresses the theca.

(4) And, lastly, the medullary symptoms may be mainly due to the pressure of hæmorrhage.

In trying to distinguish these varied lesions the one from the other, in the first place, the strong presumption is that the injury is a crush by approximation of the affected bones; but whether such be associated with permanent or with temporary compression, we can as a rule judge only by our somewhat unreliable statistics, although the presence of a marked angular curvature would indicate the persistency of displacement.

Pressure by a displaced fragment of bone we cannot recognize, although asymmetry in the level of the nerve symptoms would be suggestive of such a condition. With regard to hæmorrhage, we might expect that the onset of symptoms after accident would be less immediate than in the case of true crushing of the cord.

In two recorded instances there have been excellent results from operation for hæmorrhage into the spinal canal. The first of these is recorded by Church and Eisendrath, there being a fracture-dislocation of the tenth dorsal vertebra with complete paraplegia and laminectomy, revealing the fact that the spinal canal was filled with a firm extradural blood-clot, which was easily broken down, and which had arisen from tearing of the anterior and posterior longitudinal spinal veins. The clot having been removed by the finger and by irrigation, and all hæmorrhage having been controlled, the displaced vertebrae were reduced, and the patient recovered almost completely. The second case, published by Wagner, was one of hæmorrhage at the level of the ninth dorsal vertebra, due to a bullet wound, and causing paraplegia. Three months after the accident there was removed a firm fibrous tissue which had formed in the clot, there being again an excellent recovery.

There is, however, one unusual lesion which can be recognized, and which may be called "gravitating hæmorrhage." In such cases the diagnosis is comparatively obvious, and, although we have as yet no facts upon which to build, we are surely justified in hoping for benefit from operation.

As to what operation is most likely to be successful there may be some difference of opinion; but the author advises laminectomy at the seat of injury and endeavor to arrest the hæmorrhage, or at least to give exit to the blood, combining this procedure in the first instance with paracentesis of the meninges in the lumbar region after Quincke's method, or, if the result were not satisfactory, a secondary laminectomy at the lower part of the spine.

For all practical purposes, we have, however, three varieties of injury which call for treatment,—namely, permanent pressure upon

the cord, temporary crushing of the cord, and hæmorrhage. The latter is so rare and so little likely to be diagnosed that we are almost justified in neglecting it. As regards the two former, it is clear that in cases of temporary compression—which constitute the majority—laminectomy is necessarily useless. The crush is over; the cord has already sustained its maximum of injury, and it lies in the best possible position for recovery, if such be possible. In cases of permanent compression, on the other hand, we may certainly restore the normal lumen of the vertebral canal, but we can hardly hope to do much, if any, good to our patient; in the first place, because, as we have already seen, the injured cord will not be capable of regeneration, and in the second place because the extreme mortality—or at least persistency of symptoms—in the cases of temporary compression is such that we can hardly hope for benefit in the more severe cases in which the compression has been permanent.

Of 7 cases under the author's observation in 3 there was no permanent pressure, and the operation met no indication whatever. In two there was pressure upon the cord, but this was not removed by laminectomy, and even had it been removed by chiselling away the bony prominence on the anterior aspect of the theca, the injury done to the cord was such that the operation would probably have been useless. In the remaining two cases the extent of the dissection does not allow him to say with absolute certainty what the pathological condition really was. In none of the cases did any real benefit result; all those in which the injury was in the cervical region died; all those in which it was below the cervical lived, but did not recover from paralysis. And, lastly, in all those cases in which death did not cut short its progress the wound healed readily.

The published cases, of which there are about 200, show no better results, if we exclude injuries of the laminae, hæmorrhage, and operations upon the cauda equina. It does not appear beyond question that there have been any successes as regards recovery of function, save such as may be attributed to the regeneration of nerve-roots only, or to the natural recovery of a cord which was but very slightly injured.

The only question, therefore, which remains to us is, Are we justified in expecting in future any better results than those which we have met with in the past? There appear but two directions in which we may hope to improve the operation. The first is by operating at an earlier period,—immediately after the accident; the second is by extending our laminectomy to the chiselling away of the bony projection on the anterior aspect of the theca, as is so strongly urged by Urban and Chipault. On the *à priori* grounds which have been already mentioned, it is to be feared, however, that we have little to hope for in either direction, and that we are not yet able to treat with success the common injuries of the spinal cord.

In intractable injuries of the cauda equina operations may be advocated mainly upon two grounds,—namely: (1) that we may here expect a regeneration of the nerve-roots, the physiological evidence being strongly in favor of such regeneration and not against it, as in the case of the cord; (2) that the absence of spontaneous recovery in such cases in itself indicates the presence of a mechanical obstacle, such as permanent compression by bone, blood-clot, or cicatrix; otherwise we should expect the roots of the cauda equina to recover as other peripheral nerves after severe bruises.

The only point now needing discussion is that of the most suitable time for operation. It is to be remembered that some cases will recover spontaneously,—cases probably in which there has been no extensive tearing of the roots or intervention of tissue between their ends. Hence, then, we must not operate too early. On the other hand, should we delay too long, secondary degenerations will render the ultimate prognosis bad. Between these two difficulties we can hardly dogmatize as to the most suitable time for interference. Personally, the author has taken as a rough rule that we should operate at the end of six weeks if there has been little or no recovery, or if recovery has ceased to progress.

Pathology of Paraplegia in Vertebral Caries.—Caries of the spine may produce paraplegia in one or other of the following different ways:

(1) In a few rare cases angular curvature has been found to cause compression of the cord.

(2) Sudden paraplegia may result from fracture of carious vertebræ, but this is not a common condition. Kraske estimated cases of this nature to form but 2 per cent. of the total number of paraplegias depending upon vertebral caries. These cases also stand apart in their pathology, the essential lesion being here a fracture-dislocation; laminectomy can here only do harm, in so far as it further weakens the already fragile spine, whereas, the cord lesion is not due to simple pressure but to an irreparable crush. Probably, therefore, the most suitable treatment of cases of this nature will be by extension and fixation of the spine.

(3) Rare causes of paraplegia are the bursting of abscesses into the spinal canal, hæmorrhage into the canal, and the displacement of bony sequestra, which press upon the cord.

(4) The most usual cause of paraplegia is pressure by granulation tissue, which may or may not be caseous; this pressure being accompanied by irritative non-tuberculous pachymeningitis.

(5) Lastly, in a few cases true tuberculous periarteritis is found within the cord, generally in association with tuberculous leptomeningitis, due to the perforation of the theca by the diseased process.

The condition usually found, both after death and during operation, is, however, certainly that of pressure by granulation tissue or abscess (that is, granulation tissue which has softened) accompanied by non-tuberculous pachymeningitis and with either a small firm cord or a swollen œdematous cord. Local degeneration with secondary degenerative changes in the ascending and descending tracts follow. The pressure may be either directly backward or lateralized, or, in cases of posterior caries, from behind forward. Further, in a few cases, no anatomical changes have been found, and in one of the author's operations the condition revealed appeared hardly sufficient to have given rise to the symptoms which were present, although the latter rapidly recovered after laminectomy.

Prognosis.—It is common clinical experience that recovery will

usually occur after prolonged rest with fixation of the spine, but the limitations of ordinary hospital experience render it difficult to estimate in figures the frequency of this result. The author's experience is that nearly all cases will recover if kept fixed in the recumbent position for a sufficiently long time, but the time required may be very prolonged. Of all the cases which he has met with, other than those submitted to operation, he knows of only one in which the patient did not recover, or was not manifestly recovering when lost sight of. On the other hand, relapses are unquestionably common, and recovery is rarely, if ever, absolutely perfect, there being at least some exaggeration of the deep reflexes which, persisting through life, indicates the previous existence of the paralysis.

Cases in which the paraplegia is due to intramedullary tuberculous periarteritis can hardly be expected to get well, and those in which pressure has arisen from fracture of the carious bones are not likely to improve to any great extent. So also in some of the other rare varieties of paraplegia we have little to hope for, but, unfortunately, these are just the cases in which we can hardly expect any benefit from operative treatment.

Indications for Operation.—Assuming the prognosis to be thus favorable, we are never called upon to perform laminectomy save under certain special conditions. It will not be argued that the recovery after laminectomy is more complete than that produced by Nature, and experience shows that relapses also are only too common after operation. The indications which appear to him to point to the necessity for operation are as follows:

(1) A steady increase in symptoms in spite of favorable conditions and treatment.

(2) The presence of symptoms which directly threaten life, such as secondary chest-troubles and intractable cystitis.

(3) The persistence of symptoms in spite of complete rest is the indication which has been most commonly adopted, but such symptoms may persist for very long periods and then yield to absolute rest. It is, however, not improbable that, in a few cases, cicatricial pachy-

meningitis or, rather, peripachymeningitis may remain after the original pressure lesion has ceased to act, and may thus keep up paraplegia until the constricting tissue is removed.

(4) In posterior caries (that is, in caries of the arches of the vertebræ) operation is clearly indicated, as here we can readily both treat the paraplegia and remove the whole of the tuberculous tissue.

(5) The existence of severe pain, which is rapidly exhausting the patient, may be regarded as an indication for surgical interference.

(6) Lastly, children, as a rule, yield better results than do adults, so that, other things being equal, childhood may also be regarded as an indication for operation.

Contraindications.—On the other hand, there are certain definite contraindications, such as the presence of active tuberculous changes in other organs. Macewen holds that we should not operate when there is pyrexia, which is almost tantamount to saying that we should not operate in presence of active tuberculosis. If, however, the pyrexia were clearly due to cystitis, then we might regard it as an indication for, rather than against, interference. Again; general meningitis (although fortunately very rare) will, at times, obviously be present, and will probably prove fatal whether we operate or not. Cases of fracture following upon caries have already been mentioned as unsuitable for laminectomy, and most paraplegias of sudden onset will fall into this category.

Results in Recorded Cases.—It is difficult to estimate the mortality of these cases,—that is to say, how far the mortality is due to the operation itself,—but from 17 to 20 per cent. of deaths is not far from an accurate estimate. By far the most common cause of death has been shock or syncope; in a few cases myelitis or meningitis has proved fatal; in one the result was due to hæmorrhage into the cord; and in one to hæmorrhage from the vertebral artery at the time of operation.

As regards cure of the paraplegia, the immediate result has often been good, the symptoms improving even if they do not entirely disappear; but, unfortunately, recurrence is not uncommon, and in not

a few cases a tuberculous sinus forms in the healed wound. This simply means that we have not fully cleared out the tuberculous tissue, and hence we are met by the usual difficulty in the surgery of tuberculosis, the difficulty of removing the disease by any conservative operation.

In the earlier cases no attempt was made at complete elimination of the tuberculous tissue, but in the modern and bolder operation, so strongly urged by Urban and Chipault, we may hope occasionally to succeed, although the probabilities of failure must remain considerable. The most satisfactory results have been those obtained in cases of peripachymeningitis in which the original tuberculous disease has ceased.

Lastly, it is to be remembered that, in some, at least, of the apparently successful operations, it is probable that the associated rest and fixation of the spine would alone have sufficed to produce the fortunate result.

The other diseases which may cause pressure lesions of the spinal cord he tabulates as follows :

Diseases arising externally to the spine :

- Hydatids.
- Aneurisms.
- Sarcoma and other growths.

Diseases of the vertebra :

- | | |
|------------|----------------------|
| Carcinoma. | Syphilitic deposits. |
| Sarcoma. | Osteo-arthritis. |
| Osteoma. | Spondylolisthesis. |

Diseases of meninges or perimeningeal tissue :

- | | |
|------------------|-----------------------|
| Tumors. | Meningitis. |
| Pachymeningitis. | Spira bifida. |
| Hæmorrhage. | Spina bifida occulta. |

Diseases of the spinal cord :

- Tumors.
- Syringomyelia.

A few cases of hydatids have been submitted to operation, which has uniformly proved fatal, but the mortality has generally been due

to sepsis, and there is no reason why in such cases we should abandon surgical treatment.

Aneurisms penetrating the vertebral canal are obviously utterly unsuited for operation.

Several cases are reported of tumors arising externally to the spine and penetrating to the vertebral canal. Thus, in 1889 was recorded a case of Mr. Wright's in which great relief was given by scraping out the intraspinal prolongation of a fibro-sarcoma of the neck. Five years later recurrence had occurred with return of paralysis, and laminectomy revealed a general infiltration of the vertebral arches, no benefit being derived. In 1856, Athol Johnstone successfully removed a lipoma situated over the sacrum, which had penetrated into the vertebral canal. Possibly, however, this may have been a case of spina bifida occulta.

Growths of the spine itself have also been submitted to operation, there being several such cases in which the primary lesion was a sarcoma of the laminae. Of these Mr. Davies-Colley's case resulted in recovery from the cord symptoms, but in all the growths have recurred.

The only rule, then, that we can adopt in cases of this class—that is, in cases of pressure lesions arising externally to the spine, or arising in the vertebrae themselves—is that pressure on the cord does not *per se* contraindicate operation, and we must be guided in our practice by the general rules of surgery.

With respect to tumors of the meninges operated upon there are now eight recorded cases, with four deaths, three complete recoveries, and one in which no benefit resulted, the latter, however, being a case in which symptoms had existed for twelve years at the time of operation. These figures indicate that laminectomy has saved from certain death more than one-third of these cases.

As regards meningitis, although the author knows of no operation in the form known as hypertrophic cervical pachymeningitis, it seems to him not improbable that good results may be here obtained. White and Dercum operated in the cervical region in a case of

complete paraplegia of rapid onset, finding only adhesions between the dura and pia mater. These being separated, complete recovery followed, but the true nature of the case is somewhat doubtful.

In two cases only do we find the records of operative interference for disease situated within the spinal cord. Church and Eisendrath report a case of removal of a sarcoma, which was situated in the posterior fibres, the patient dying from septicæmia. The growth was readily enucleated, but *post-mortem* examination revealed a blood-clot extending almost transversely across the cord. It is unfortunate that in this case the septic accident did not allow us to judge of the ultimate possible result. Abbe has punctured a syringomyelia without benefit.

Spina Bifida and Spina Bifida Occulta.—The author concludes his lectures by calling attention to the results of pressure on the cord occurring as the result of cicatricial or hypertrophic changes in certain cases of bifid spine. Paralytic and trophic degenerations, such as motor and sensory paralysis of varying extent, perforating ulcer of the foot, chronic osteitis of the metatarsus, talipes, dislocation of the hip, pain, have been observed in the published cases of this kind. Cases of this nature he recommends to be subjected to surgical treatment.

INDEX TO SURGICAL PROGRESS.

GENERAL SURGERY.

I. Experimental Investigations in the Infection of Wounds. By Dr. SCHIMMELBUSCH (Berlin). Experimental studies of wound-infection are carried out with difficulty because the exciting causes of the infection do not operate the same upon animals as upon man. It is possible, however, to transfer the staphylococci and streptococci from phlegmonous processes in man to rabbits, guinea-pigs, and mice, and in them cause a phlegmonous inflammation.

The causes of inflammations in the wounds of animals have been studied separately by the veterinary physicians. It is interesting that the bacteria which cause the wound-inflammation in the horse, cow, and other animals, are different from those which cause inflammations in man ; and each species of animals seems to have a peculiar variety of bacteria of its own.

Suppuration in recent and old wounds, eczema, etc., occurs spontaneously in rabbits, rats, and mice, due to special organisms. There are bacteria which, even in the smallest numbers, will cause phlegmon in rabbits. They are bacilli which have nothing to do with the pyogenic organisms found in man ; though they are capable in these animals of causing an extensive inflammatory process which may lead to death.

Septic bacteria are rapidly absorbed from fresh wounds. If a mouse is inoculated with anthrax at the tip of its tail, amputation of the tail, after ten minutes, does not save the animal.

Richter has shown that the anthrax bacillus is found in the lungs, liver, kidneys, and spleen, half an hour after such an inoculation. A large number of experiments with pathogenic and non-pathogenic organisms have shown that in five minutes after bacteria are in-

roduced into a fresh wound they can be found in the internal viscera.

Old wounds and burns do not absorb bacteria so rapidly.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

II. On the Disinfection of Fresh Wounds. By Dr. HENLE (Breslau). Schimmelbusch's observations confirm those of Henle. The former has introduced finely-powdered cinnabar in fresh wounds in the tail of the mouse and the ear of the rabbit, and found that after five minutes the particles of the metal had passed into the lymph-channels, and were far beyond the reach of antiseptic fluids. The experiments demonstrate the usefulness of antiseptics in septic infections.

The experiments of Schimmelbusch were carried out with highly virulent organisms,—pure cultures in large amounts. He has not thus represented the natural conditions. The difference in the virulence of different bacteria rests in the resistance of the organism against the tissues of the body. Some can develop alone in the juices of the body, and others thrive when they have caused the destruction of a given area, or have found a *locus minoris resistentiæ*. Every wound is in a greater or lesser degree a *locus minoris resistentiæ*, and invites the colonization of bacteria which have not a high degree of virulence. Microscopic examination of the wounds in rabbits' ears, which had been infected with streptococcus pus, showed a migration of the organisms into the lymph-channels only after six hours have elapsed.

Henle concludes that an antiseptic irrigation of a wound is a proper surgical procedure. He infected rabbits' ears with streptococcus pus, and irrigated the wounds with 1 : 1000 mercuric solution, or 4-per-cent. carbolic. The disinfection had a full effect two hours after the infection. When employed six hours after, the severity of the infection was greatly diminished. In these cases one ear was infected and used as a control wound.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

III. Experimental Studies in the Treatment of Infected Wounds. By Dr. MESSNER (Munich). Messner experimented with twenty-three rabbits to find how practicable it was to disinfect wounds which had been infected with fresh pus, or with pure cultures of pyogenic bacteria, by irrigation with 3-per-cent. lysol or carbolic solution.

He experimented always with two animals of the same litter, and similar in size, color, and weight. Both animals were infected in the same manner. A wound two centimetres long was made in the fleshy part of the front leg through the skin, fascia, and muscle. Into this wound two cubic centimetres of pus or bouillon pus culture was introduced, and the whole covered with a dry aseptic dressing. At the end of a given time—up to eighteen hours after the infection—the bandages were removed from each animal, and one of the wounds washed out with $\frac{3}{4}$ -per-cent. sterilized salt solution, and again covered with a dry aseptic dressing. The wound in the other animal was washed out in a similar way with 3-per-cent. lysol or carbolic solution at 37° F. The disinfected wound was then loosely packed with wet carbolized gauze, and about the whole a wet carbolic dressing was applied, which was renewed after twelve hours. After that the wound was dressed with dry aseptic dressings. As a result of these experiments, of the ten rabbits treated aseptically all but one died, in from eight to fourteen days, of extensive phlegmonous suppuration; while of the ten animals treated antiseptically, all but one recovered. In two of the antiseptically treated cases the wounds healed without suppuration. Moderate suppuration occurred in the others, and was entirely limited to the narrow area immediately about the wound. But one of these animals had an extensive phlegmonous process. Further inoculations were made with the pus from the two sets of animals; and the one was found highly virulent, while the latter had entirely lost its virulence. All of the animals which were inoculated with the pus from the aseptically-treated wounds perished in from twenty-four to forty-eight hours, while those inoculated from the antiseptic wounds all lived.

From these experiments it may be concluded that it is possible in rabbits to disinfect septic wounds, eighteen hours old, by washing out with 3-per-cent. lysol or carbolic solution, and thereby give the supuration a local character and save the life of the animal.

A second series of experiments made by Messner have shown that the use of 3-per-cent. carbolic solution neither diminishes the resisting power of the tissues against pyogenic cocci nor predisposes them to supuration. He repeated, with some modification, the experiments of Hermann, using instead of 3-per-cent. carbolic solution a .75-per-cent. sterilized oil solution. This was injected under the skin of the back of a rabbit; and after one hour this was followed by one cubic centimetre of a pure bouillon culture of staphylococcus albus two days old, of which at least one cubic centimetre is necessary to produce supuration in a rabbit. In the animals treated with the $\frac{3}{4}$ -per-cent. solution of salt, supuration occurred just as in Hermann's cases, when 0.1 cubic centimetre of staphylococcus culture was injected. A second experiment established the correctness of the first, for in both control animals no abscess occurred. It is therefore not the carbolic acid which predisposes the tissue to supuration, but the saturation of the tissues with an entirely indifferent fluid.

Two further experiments were made upon rabbits to show that 3-per-cent. carbolic acid did not diminish the vitality of the tissues against pus-organisms. Messner made a wound in the muscle of the front leg of a rabbit, irrigated it with carbolic solution, packed it with wet carbolyzed gauze, and applied a wet carbolic dressing. Eighteen hours later the dressings were removed, the wound infected with a bouillon culture of pus-cocci, and covered with a dry aseptic dressing. The control animal was treated in the same manner except that the wound was not treated with carbolic solution. At the end of ten hours the dressings were removed from both animals. The wound of the control animal was washed out with $\frac{3}{4}$ -per-cent. salt solution, and a dry aseptic dressing applied; while the wound of the experimental animal was irrigated with 3-per-cent. carbolic solution,

and dressed with dry aseptic materials. This last animal continued to live, the wound healing in three weeks with some slight suppuration. The control animal died eleven days after the infection with an extensive phlegmonous process, and suppuration in the knee-joint. The same experiment was performed upon a second pair of rabbits, with exactly the same result.

From these observations it may be concluded that the treatment or irrigation of the tissues with 3-per-cent. carbolic solution, as was the practice of surgeons in the antiseptic era, in nowise diminishes the vital energy of the tissues against pyogenic cocci, or predisposes the tissues to suppuration; in fact, from the above experiments, the very opposite seems to be the case.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

IV. The Spreading of Suppurative Diseases in Closed Institutions. By Dr. C. REGER. This author, who has for many years busied himself with the study of epidemics, and who has appeared before many scientific bodies with his studies of the dissemination of various infectious diseases based upon a large amount of material, has in this paper presented a vast table dealing especially with the suppurative diseases from the very beginning of their course.

First are given the typical cases of (*a*) measles, r \ddot{o} theln, and varicella, and (*b*) diphtheria, scarlatina, influenza, pneumonia, erysipelas, and conjunctivitis. He shows with these examples that notwithstanding the immediate isolation of the initial cases, they were followed in the course of time by another outbreak, after which came another pause followed by another outbreak in regular intervals. Consequently the spreading of the disease can only take place by a changing of the host, and consequently the living man is essential for a continuation of the disease, for it is not contagious during the period of incubation, but becomes contagious when the micro-organisms reach their full development. Therefore, the rooms and utensils used about the patient are matters of but little importance in the transmission of these diseases.

While it can be shown that in the first-named group of specific

diseases the cases go on one after another in an unbroken chain, in the second group the chain is longer but is repeatedly interrupted. It often happens that at the place where a certain disease is expected another disease appears which has a different name, but which clinically has much in common. This occurs among the large group of pus-diseases. Belonging to this group Reger finds catarrhs and inflammations of the mucous membrane of the respiratory and digestive tracts, the anginae, the inflammatory diseases of the auricular canal, rheumatism, inflammations of the serous membranes, and the skin, and also the diseases accompanied with suppuration or with formation of muco-pus, serum, or fibrin, and which have been regarded as partially due to the contact with pus or dirt, or to the influence of external or climatic causes or to the existence of a diathesis.

The author himself is aware that the classification of such apparently heterogeneous diseases under a single group is rather unusual. He has, by constant observation of these diseases, been led to the conclusion that we have classified our diseases and named them, in the fulness of our ignorance of etiology, from some predominant symptom or from some organ which is especially or most commonly involved in the given disease.

He has observed a perfect regularity in the progress of these pus-diseases, which is exactly similar to that observed in the specific infectious diseases.

The related diseases follow one another in single cases or in groups in seven or fourteen days' intervals, so that when a type has once appeared it can be followed for months or even for a year with almost perfect clearness. In such cases it is evident that one or another of the micro-organisms of the group probably exercises a specific action and gives the peculiar character to the disease, and diseases with the same or similar names follow one another. Then, also other cases, appearing separately or in groups, form the links of the chain. Here also it appears that links of the chain may be missing, and this interval may represent the governing type of the disease. For this reason it may happen that here in the typical place diseases

must have been present, which were so mild that they were not recognized at all by the physician.

The author has demonstrated a further important fact that a repeated attack in the same individual, designated as relapse, complication or recurrence, of the dominant type, is nothing more than a new second or third or fourth generation of the micro-organism in the old host. Here also it may happen that the long interval between the outbreaks points simply to the multifariousness of the dominant type, and means that the disease during the intervals has been so mild as not to be recognized.

Consequently, Reger claims that the related diseases present only a local expression of the general infection with its large number of mixed bacteria. This is influenced by the disposition of the individual and by the opportunity offered by the point of diminished resistance, or by the tendencies of the various germs, to appear sometimes in one place, sometimes in another.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

V. The Question of the Spontaneous Healing of Cancer in Man. By Dr. EMIL SENGER (Krefeld). Senger has given especial attention to the carcinomata which are caused by chronic inflammatory irritation, as the carcinoma scroti of the chimney-sweep, "tar cancer," etc. For the past four years he has studied the tumors of the buccal cavity, which develop on the cheek or tongue opposite an irritating tooth. These tumors can be observed at a very early period in their development, and can be carefully followed during their extension. Senger found after the extirpation of these tumors that they presented the microscopic structure which every pathologist would regard as carcinomatous.

In order to decide the question as to whether these tumors are really carcinoma or not, and what the result would be after removal of the cause, Senger has experimented in two cases. He divided the tumor into two halves, extirpated one-half for microscopic examination and left the other for further observation. At the same time he

removed the offending stump of tooth. The result was that the tumor which, on account of its indurated border, its rapid growth during the last three weeks, its painfulness, etc., presented the clinical picture of carcinoma, spontaneously disappeared. The excised portion showed the typical structure of carcinoma. The value of this observation revolves about the question, Can we always depend upon the microscopic picture for the diagnosis of carcinoma? This question will receive different answers depending on whether we view it from a clinical or histological stand-point.

Since the time of Waldeyer we have been accustomed to define carcinoma as an atypical epithelial development. It would be at least a great error to designate every atypical epithelial development as carcinoma. The definition of Carl Friedländer must be accepted as the best. He assumes that an atypical epithelial development can be called carcinoma only when the epithelial development involves not only the newly-formed tumor-tissue, but also extends over into the pre-existing tissue.

In both cases studied by Senger, the demands of Friedländer's definition were fulfilled. The epithelial growth had extended into the muscle, and infiltrated the entire mucous membrane. It certainly does not seem right, however, to diagnose as carcinoma a tumor which has subsided after the removal of the irritating cause.

Senger does not claim that cancer can heal spontaneously; he simply asks the question as to whether the diagnosis of carcinoma shall be made upon histological or clinical grounds. In the latter case the spontaneous healing of carcinoma is out of the question; in the first case it is possible. At the present time we are inclined to view the subject from the clinical stand-point.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

VI. The Employment of Blood-Serum in Surgery.

By Dr. SCHLEICH (Berlin). Schleich has reported his experiences in the use of blood-serum in treatment of wounds and skin-diseases. Fresh bovine blood-serum was used, mixed with 25 per cent. of zinc

oxide. The mixture was spread upon glass plates, allowed to dry, and then reduced to powder. From this powder two sorts of preparations were made :

(1) The serum paste, which is soluble in water, non-irritating, free from acid, can be used as an organic covering for eczema, burns, ulcers, etc. It adheres and becomes dry in a few minutes, but can be easily washed off, and forms practically the most non-irritating vehicle, and imitates exactly the natural scab. The preparation can be sterilized at 70° C.

When heated above 100° C. there results,—

(2) The pulvis serosa, which can be used pure or mixed with iodoform, and which dries quickly and forms a scab. Schleich accomplishes hereby the formation of a moist blood-scab for which Schede strove.

(3) Wounds which were not absolutely clean are treated first with nuclein serum powder.

Nuclein, the substance of the cell nuclei, is not only a strong chemical compound, but also has the power, in 2 to 3 per cent. combination with serum powder, of eliminating the necrotic and broken-down tissue from the wound by a sort of digestive process, without doing the slightest damage to the healthy tissue. It clears away very quickly shreds of fibrin, broken-down connective tissue, bits of fascia, etc., and creates a perfectly clean wound.

(4) Mercurial serum. This is a mercurial paste which is used dried and in the place of the greasy inunctions in the treatment of syphilis. Three to five grammes of the paste are smoothly applied with a brush upon the skin, into which the inunctions have been made, and allowed to dry. Three days later the mercury paste is removed in the bath.

These preparations, the pasta serosa, the pulvis serosa (cum iodoform, cum nuclein), the pasta serosa cum hydrargyrum are manufactured in Berlin.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

VII. Further Observations upon the Treatment of Surgical Tuberculosis by Congestive Hyperæmia. By Dr. BIER (Kiel).

(1) A large percentage of joint tuberculoses heal smoothly under the treatment of congestive hyperæmia.

(2) In other cases difficulties arise in the treatment, and the disease becomes worse. The latter is usually only apparent, and is due to,—

(a) Tuberculous abscesses in closed and open lesions. They can be cured by puncture and the injection of iodoform-glycerin emulsion, and are no indication for resection. The abscesses usually are accompanied with symptoms of severe inflammation and disturbance of the function of the limb. They form rapidly, and must be diagnosed and treated as soon as possible. Sometimes they occur without symptoms, and therefore examinations should be frequently made.

(b) Hyperæmic ulcerations and granulation formation. The first heal when the congestion is relieved for a time, and the limb is elevated, kept quiet and clean. The latter finally contract under the continuation of the hyperæmia.

These are the apparent set-backs. The following are real changes for the worse :

(c) Acute inflammations complicating the tuberculosis and giving rise to "hot abscesses." They must be incised. The acute suppurative process may involve the whole joint cavity. When this occurs the joint must be resected. Erysipelas may develop. The hyperæmia should be discontinued and the disease treated as usual.

(3) The quickest results are obtained by a combination of congestive hyperæmia and iodoform injection. At the same time the joint should be immobilized.

(4) When, after the tuberculosis has greatly improved, fistulæ still remain, they should be treated in the following manner :

(a) Iodoform-glycerin should be injected in the tissue about the fistula.

(b) The congestive hyperæmia should be discontinued, and the fistulæ injected with corrosive solutions,—preferably with cupr. sulph., zinc. sulph., aa 10.0; aqu. destillat., 120.0.

(c) Sequestra should be operatively removed.

(5) The presence of large abscesses is a contraindication to the congestive treatment.

(6) Good results are obtained by congestive hypertrophy in cases of tuberculosis of the testicle and in tuberculous tendo-synovitis.

(7) This treatment is also applicable to chronic articular rheumatism, arthritis deformans, sequelæ of acute articular rheumatism, and of gonorrhœal arthritis.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

VIII. The Treatment of Surgical Tuberculosis by Congestive Hyperæmia. By Dr. ZELLER (Berlin). Zeller has reported twelve cases which he has treated by Bier's method. One was a case of tuberculosis of the carpal joints in a phthisical patient. The result was a brilliant one.

The case of knee tuberculosis in a phthisical man, fifty years of age, was for a short time improved, but eventually came to amputation.

Two cases of disease of the elbow-joint were only cured by partial resection and iodoform injection. The hyperæmia seemed to have made them worse.

Two knee-joints and two tarsal tubercloses were treated with the addition of iodoform injections, and ideal results were obtained.

He presented a young maiden who showed scarcely a sign of the former disease, and who had almost a perfectly movable knee, which had cured in five months, and which for four months had had no treatment.

A seven-year-old boy, whose knee-joint had been diseased for three months, but for the past two months had been perfectly useful, was presented.

Zeller found that the congestive hyperæmia always quickly diminished the pain, but after a time the favorable progress of the case came to a stand-still, and when the treatment alone was continued, the case grew worse. Either abscesses formed, which by puncture and iodoform injection quickly healed ; or the disease extended with the formation of granulation tissue within and outside of the joint.

Zeller recommends the treatment when it can be associated with other methods such as iodoform injection and immobilization. It seems to give especially good functional results. Iodoform seems also to operate more quickly and effectively in hyperæmic tissue. The treatment seems also to diminish the danger of atrophy and disturbances of development of the limb.

He recommends this treatment especially in joint tuberculosis.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

IX. A Peculiar Form of Skin Gangrene and Pustulæ.

By Dr. J. ROTTER (Berlin). Rotter presented a twenty-three-year-old man, who had suffered from the beginning to the end of the second week of the disease with a gangrene of the skin which extended into the fascia, and which involved nearly half of the surface of the right leg.

From the beginning of the second until the end of the fifth week of the disease there appeared upon the right leg ten pustulæ the size of a silver half-dollar, each containing bloody pus, and involving the tissues down to the superficial layer of the deep fascia. From the beginning of the second week until the end of the disease—fourth month—some twenty-five or thirty small pustules involving only the skin, and containing bloody pus, appeared upon the right leg, scrotum, and penis.

Rotter was able to isolate a bacillus from the pus, which was regarded as the cause of the disease, because,—

(1) It was constantly present in the gangrene and in the pustulæ ;

(2) A reinoculation of the patient with the germ caused the formation of a pustule after seven days' incubation ;

(3) And because an immunizing substance was found in the blood of the patient, which was capable of rendering mice immune from the disease or acting therapeutically upon infected mice. This immunizing substance was still present in small amount in the blood at the seventh week.

No such disease as this has been heretofore described.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

JAMES P. WARBASSE (Brooklyn).

OPERATIVE SURGERY.

Osteoplastic Resection of the Sacrum after the Method of Rydygier. By F. KAMMERER (New York). The author reports six cases in which to gain access to the rectum he resorted to osteoplastic resection of the sacrum after the method of Rydygier. In this operation the soft parts are first divided along the left border of the sacrum by an incision beginning at the posterior superior spine of the ilium on the left side and running down to the tip of the coccyx, and thence in the median line to the anus. After division of the sacro-sciatic ligaments, the soft parts are detached from the anterior surface of the sacrum by the hand of the operator. A transverse incision is then added below the third sacral foramen, and the bone divided along this line with a chisel. The flap thus formed is now turned to the right side, and with a retractor inserted at the tip of the flap is easily held aside, and permits manipulations about the rectum to be made as readily as when the bone has been entirely removed.

The author reports that in his experience he has been impressed by the rapidity with which this preliminary operation can be done, and also by the fact that the osteoplastic resection is a much less bloody operation than the permanent removal of coccyx and sacrum by any one of the other methods which involved dissection of the soft parts from the posterior surface of the sacrum.

He recommends further the knee-elbow posture, with its distinct elevation of the pelvis, as the most desirable one for rectal surgery, since it controls hæmorrhage through elevation, gives excellent access to the field of operation, and facilitates manipulations with the chisel, the pelvis being supported by sand-bags placed under the anterior iliac spines.

When the nature of the case permits the flap to be returned to its place and sutured, the result will be an ideal one as regards restitution of the normal contour of the sacral region. In suturing the transverse incision the author has always passed the needle down to the bone, but has never included the bone itself in a suture by any device. Nevertheless, firm union of the bone-surfaces has always followed. Where secondary operations have necessitated renewed elevation of the flap, he has not found the secondary operation any more tedious than the first; greater care only being required to avoid the rectum which has become drawn close to the anterior face of the sacrum by cicatricial contraction. In cases in which tamponnade of the wound cavity is necessary for some time, the temptation to suture the flap back should be resisted, and the wound cavity be left entirely open, notwithstanding some retraction of the flap and some deformity will develop after a time. Any such deformity can be readily remedied by a subsequent slight plastic operation.—*Medical Record*, July 28, 1894.

ABDOMEN.

I. Splenectomy for Enlarged Spleen with Twisted Pedicle followed by Recovery. By W. J. CONKLIN, M.D. (Dayton, Ohio). The patient was a woman, twenty-nine years of age, the subject of an enlarged spleen, presumably of malarial origin. No examinations of the blood were made, but the symptoms of leukæmia were absent. She had for some months been cognizant of a freely movable tumor in the lower abdomen. An abdominal section demonstrated the tumor to be the enlarged and displaced spleen. She also had a small cyst of one ovary, which was removed. The

spleen was replaced in its proper position, and a suitable retaining bandage advised. Three months later, while doing the family washing, she was seized with agonizing pain in the abdomen, followed by persistent vomiting, tympanitic and tender abdomen, obstinate constipation, and great increase in the size of the tumor. Temperature at first normal, after some days began to range from 99° F. to 101° F. After the continuance of these symptoms with irregular fluctuations for two weeks, the abdomen was again opened by a long incision along the outer border of the left rectus muscle. The greatly-swollen spleen was found with extensive adhesions to abdominal wall, omentum, and intestines. The pedicle was long, twisted through three complete turns, and with its engorged and tortuous vessels resembled a huge umbilical cord. It was transfixed and tied with silk and dropped back. The hæmorrhage attending the operation was slight and easily controlled. The shock, however, was profound and long-continued. After reaction was obtained the subsequent convalescence was uneventful. There were no subsequent glandular swellings. The minute examination of the removed spleen showed thickening of the trabecular and intercellular connective tissue, and pigment in the vessel walls, indicative of chronic hyperplasia, probably due to malaria.

Seven months after the removal of the spleen, when the report was made, the patient has grown very fleshy, and is in excellent health, save a very troublesome tendency to drowsiness.—*Medical Record*, July 28, 1894.

II. Stomach-Reefing. By Dr. BRANDT (Klausenburg). This operation has been performed by Brandt for dilatation of the stomach. It is well known that the stomach becomes enlarged in cases of pyloric stenosis due to new growth, cicatricial contraction, or bands of adhesions. The rational treatment of this stomach-trouble is the removal of the cause. This is accomplished by pylorus resection and excision of pyloric cicatrices, which have been so successfully done during the past few years. It sometimes happens, however, that after opening the abdomen no such a cause is found for

the dilatation. If the wound is closed, the laparotomy has been nothing more than an explorative operation, and the patient continues to suffer from the disease, the case being then regarded as a medical one and a subject for medical treatment. It has occurred to Brandt to treat these idiopathic cases by diminishing the size of the stomach by folding in its wall and suturing it through the serosa and muscularis.

The patient upon whom he operated was a woman, twenty-six years of age. The gastric sound could be introduced till it struck the pubes and left Poupart's ligament. Palpation revealed no tumor of the pyloric or other region, nor even an abnormal resistance. The patient was poorly nourished and greatly reduced in strength. She was treated medicinally by faradization and lavage of the stomach with little improvement. After this treatment had been carried on for two months, Brandt made an opening into the abdomen parallel with the left costal arch, and explored the stomach and other abdominal contents. The pylorus was especially examined, and nothing found. The organ was found enormously enlarged. He then proceeded to fold in the anterior wall and suture it by two rows of transverse sutures. The same was done on the posterior wall through holes torn through the greater omentum. More than two hundred sutures were applied.

The patient made an excellent recovery, without any disturbance of digestion, and was able to leave her bed on the tenth day.

Brandt has published this case as preliminary to a more exhaustive communication upon the subject.

The same operation has been described under the head of "gastroraphie" in the same periodical.—*Centralblatt für Chirurgie*, No. 46, 1892, No. 16, 1894.

JAMES P. WARBASSE (Brooklyn).

III. Traumatic Rupture of Intestine; Recovery after Laparotomy and Suture of Gut. By W. THELWALL THOMAS, F.R.C.S. (Liverpool). A woman, aged fifty-five years, was admitted into the Liverpool Royal Infirmary on April 3, complaining of

abdominal pain and vomiting. Twenty-four hours previously, while returning from her garden into the house carrying a chair before her, she inadvertently struck the door-post, bringing her abdomen into violent contact with the other side of the chair. This caused her severe pain, and she vomited immediately afterwards. The pain continued, increased, and with difficulty she managed in a doubled-up condition to reach her bed, when she again vomited.

She vomited again next morning, and the abdomen continued to distend. When admitted, the patient, a thin woman, walked across the casualty room, and without assistance climbed onto a couch for examination. She was in good general condition, the tongue moist, pulse about 80 and strong. The abdomen was distended and very tender on palpation. The recti muscles were rigid and standing prominently on the thin walls. In the left Scarpa's triangle could be felt an irregular nodule, the size of a walnut, firmly adherent to a linear cicatrix, the site of a femoral hernia which had been operated upon four years before. A recurrence of the hernia was diagnosed.

Half an hour after admission the swelling in the groin was explored and found to be the old femoral sac firmly adherent to the femoral vein. In the centre was a narrow canal through which the little finger was forced. No bowel was discovered, but there rushed out a few ounces of putrid serum containing flakes of yellowish lymph. It was now clear that the intestine was ruptured. The femoral sac was ligatured, the wound thoroughly carbolized, and a temporary dressing was applied and held in position by a dresser.

The abdominal wall was rapidly cleansed. An incision two and a half inches in length was made below the umbilicus, when half a pint or so of putrid serum with large yellowish flakes of puriform lymph escaped. The intestines were all distended. No collapsed coils could be found, so the small intestine was withdrawn. After two feet had been examined, a perforation was found situated opposite the mesentery, oval in shape, measuring three-quarters inch by one-quarter inch, from which oozed liquid faecal matter. The long axis of the aperture was parallel to the long axis of the intestine, and the mucous

membrane was everted. The intestines were congested and glued together by yellow lymph. The gut was clamped above and below by finger and thumb, and the segment thus isolated washed out with 1 in 100 carbolic lotion, two rows of continuous Lembert sutures were applied, the mucous membrane being carefully tucked in. Subsequently two interrupted Lembert sutures were used where the union was considered weak. Green catgut was employed. On relieving the bowel no leakage took place, so after thoroughly irrigating the abdomen with 1 in 100 carbolic lotion, the fingers agitating the intestines and liberating pocketed serum, the sutured portion was reintroduced. The wound was closed by four silkworm-gut sutures, and a small glass drainage-tube inserted.

The groin wound was again cleansed and sutured. At the end of the operation, which lasted thirty-five minutes, the patient was in good condition.

Subsequently no opium was given. Sips of warm water or weak tea were ordered if asked for. Next morning at 3 A.M. the patient vomited some milk which had been taken before admission. On the third day redness was noticed around the groin wound. The stitches were removed, some cellular tissue sloughs (probably caused by the putrid serum) removed, and the surface swabbed with pure carbolic acid. This ended the cellulitis. Flatus passed, and the abdomen was much less distended.

On the fourth day the glass tube was removed. Five ounces of milk were allowed in twenty-four hours. On the sixth day half a pint of beef-tea was added to the diet. On the tenth day the bowels were well moved by enema. On the eleventh day fish was added to the diet. From this day recovery was uninterrupted.

IV. A New Operation for the Radical Cure of Femoral Hernia. By Dr. ED. BASSINI (Padua). The success attending the author's method of treating inguinal hernia has led him to publish his method for the radical cure of femoral hernia.

The operation is done by placing the patient on the back with the pelvis elevated. An incision is made parallel to Poupart's liga-

ment, with its centre over the centre of the tumor. The incision is carried down to the sac, which is isolated and opened. The bowel is replaced and the sac ligated and removed. Poupart's ligament, the pectineal fascia, the pectineal line, and the falciform fascia are now recognized. With a curved needle and fine silk Poupart's ligament is sewed to the pectineal fascia at its origin from the pectineal line. Three sutures are sufficient. The first perforates Poupart's ligament near the spine of the pubis; the second is placed one-half centimetre externally, and the third is placed one centimetre internal to the femoral vein. These sutures are not tied until after the others are placed. Four other sutures are passed through the edge of the falciform fascia, and then through the pectineal fascia a little internal to the points of entrance in the falciform. The lower suture is placed just above the saphenous vein.

The sutures are now tied. The upper ones draw Poupart's ligament backward to the pectineal line and close the mouth of the canal; the other sutures approximate the anterior and posterior walls of the canal. The skin is next sutured and no drainage used.

The author has done fifty-four operations on fifty-one individuals, all of whom were cured and left the clinic in from eight to twenty days. Forty-one cases have been kept under observation from two to nine years, and in no case has a recurrence occurred.—*Archiv für klinische Chirurgie*, Bd. 47.

GEORGE R. WHITE (New York).

REVIEWS OF BOOKS.

PYOGENIC INFECTIVE DISEASES OF THE BRAIN AND SPINAL CORD ;
MENINGITIS, ABSCESS OF THE BRAIN, INFECTIVE SINUS THROM-
BOSIS. By WILLIAM MACEWEN, M.D., Glasgow. Crown 8vo.;
illustrated ; 354 pages. New York : Macmillan & Co., 1893.

“Pyogenic infective diseases of the cerebro-spinal system have only of late years begun to be duly appreciated, and, though additions are being rapidly made to our experience, the knowledge possessed concerning them is still imperfect. Abscess of the brain and other pyogenic intracranial affections occur much more frequently than is usually supposed.” The personal experience of the author during the past decade is the basis upon which the volume rests, and this thorough and accurate account of his brilliant achievements in this class of cases will go far towards supporting his statements, and towards making smoother the path which leads to this new realm of surgery.

Like all other surgeons of repute, Dr. Macewen believes that anatomy is the corner-stone upon which to build the surgical superstructure. The first part of the book, therefore, is devoted to the descriptive anatomy of the tissues involved in the disease processes. The anatomy of the temporal bone is the *pièce de résistance* of the chapter, but other subjects, especially the venous supply of the head and the structure and relations of the cerebral membranes, are not neglected. The influence exerted by defects in development, by various anatomical anomalies, and by the age of the patient are also pointed out, and are illustrated by actual examples.

No attempt is made to separate the pathology of abscess of the brain from that of the condition with which it is so frequently asso-

ciated,—infective meningitis. Both are dealt with in the same chapter. The influence upon these diseases, exerted by the anatomical structure of the parts involved and by the nature of the infective micro-organism and the virulence of its action, is clearly shown. In the description of the injuries and the pathological conditions which lead to intracranial diseases attention is directed to the ease with which punctured fractures heal superficially, and thus conceal the more serious and often fatal lesion in bone and brain.

The fact is emphasized that inflammatory processes existing in the middle ear, in the mastoid cells, or in the ethmoid or sphenoid sinuses, are very prone to extend and involve the adjacent structures lying within the cerebral cavity in a progressive and often fatal disease.

The pathological changes in the various forms of meningitis, in ulceration of the brain, and in abscess of the brain are carefully described. The author's views as to the etiology and progress of these conditions are supported by reports and illustrations of numerous cases.

This chapter upon pathology is without doubt the most valuable one in the book, for upon such reliable, accurate, and complete data future development in the line of prophylaxis and treatment must depend.

Chapter III. is devoted to the subject of abscess of the brain. According to the writer, "The course of this disease, with its accompanying phenomena, may be conveniently divided into three stages, each differing markedly from the others. The first includes the initiatory symptoms, the second those of the fully-formed abscess, while the third embraces those connected with the various terminations of that affection when uninterrupted by treatment."

In the great majority of cases, other than traumatic or pyæmic, the patient has had a chronic purulent discharge from the middle ear, or he has had a chronic ulceration about the nose or mouth. This primary lesion and such symptoms as pain, vomiting, and rigors which gradually develop mark the initiatory stage. The sufferer,

however, is rarely seen by the surgeon at this time; with the development of cerebral symptoms of a more marked character more cases come under his immediate observation. The symptoms of this second stage, and, indeed, of the entire course of the disease, are considered individually, and full details are given. Practical aids to diagnosis are furnished through the medium of the physical signs, temperature charts, and various phenomena observed in actual cases of abscess of the brain, involving various portions of that organ. All of these are finally happily blended into a vivid description of the disease as a whole, which cannot fail to be of value to the clinician.

An introductory note tracing the development of knowledge regarding thrombosis of the intracranial sinuses is placed at the beginning of the chapter upon these rare and still more rarely diagnosed conditions. Two forms of thrombosis, marasmic and infective, are described, including pathology, symptoms, and treatment, first of the disease in general, and then of the individual sinuses.

"Since the majority of pyogenic affections of the brain arise from neglected otitis media, they ought to be regarded as preventable diseases, and their prophylaxis scrupulously attended to." In that portion of the book, therefore, which is devoted to the treatment of these various conditions, the prophylaxis is the first subject to be considered. Complete details are given of the technique to be followed in rendering the parts aseptic in scalp-wounds and compound fractures of the skull.

Another valuable paragraph in this chapter is upon the indications for opening the mastoid antrum and cells. These indications are as follows:

(1) Repeated inflammations of the mastoid antrum and cells, accompanied by swelling over the mastoid process, or where there is a fistulous opening in the bone discharging pus.

(2) Acute inflammations of the mastoid antrum and cells with retention of pus within them.

(3) When there are initial symptoms of intracranial involvement associated with purulent otorrhœa.

(4) Persistent chronic otorrhœas, not principally due to the condition of the tympanum, or Eustachian tube, and which have long resisted approved treatment, or which are deemed by an aurist otherwise incurable, even though there be no abscess, cedema, or inflammatory indication over the mastoid.

The preparation of the patient, the instruments required, the anatomical points to be noted when the bone is exposed, and the final opening of antrum or mastoid cells are all explained with clearness. On account of the dangers and disadvantages attendant upon the use of the mallet and chisel, the author prefers the rotary bur in these operations.

The operations upon the sigmoid sinus, and upon other points of cerebral infection, are equally well described.

The following summary will do much to emphasize the value of Dr. Macewen's masterpiece, and to correct the imperfect and, perhaps, erroneous estimate which might be formed from this meager outline of the work.

The author has had fifty-four cases of ablation of the mastoid antrum and cells, with the removal of infective material from the middle ear. In none of these has the sigmoid sinus been opened purposely, nor has it in any case been wounded accidentally. In but one of these cases was the facial nerve encroached upon as it lay enclosed within a mass of granulation tissue. In thirty-eight of them the inflammation was limited to the antrum and cells; all were cured. In the others the petrous bone and its recesses were also involved; five of these were cured and eleven were greatly benefited.

Seventeen cases of infective pachymeningitis externa, some with small extradural abscess, were submitted to operation; all recovered.

Twelve cases of infective purulent leptomeningitis were seen; six were operated on and recovered, five of these were of the cerebral fossa and one of the cerebellar fossa. Previous to those six cases there were six cases seen by the author which were considered, *at*

that time, as beyond hope. They were not operated on, and subsequently died. As such cases are usually regarded as hopeless, the results in the first six cases give much encouragement for the future.

In six cases of cerebro-spinal leptomeningitis four were operated on with one recovery. In those that succumbed, the autopsy showed involvement of the whole cerebro-spinal system; in several instances pus was found spread over the base of the brain and cord as far as the cauda equina; recovery under such circumstances was not to be expected.

Of cases of infective sinus thrombosis there were twenty-eight cases with eight deaths.

Twenty-five cases of abscess of the brain were seen; nineteen were operated upon and eighteen recovered. When it is remembered that it was only in 1881 that the first case of cerebral abscess was diagnosed from localizing symptoms, and was operated on during life; and that it was five years later before Dr. Gowers and Mr. Barker had the honor to record the first case of a successful operation, the importance and relative magnitude of Dr. Macewen's labors are made more evident.

The book, as a whole, reflects great credit upon the publishers as well as upon the author. The paper is good, the printing is clear, and the text is remarkably free from typographical errors. The table of contents and the index are full and reliable.

With three exceptions, which are taken from "Quain's Anatomy," the sixty illustrations which the book contains have been especially engraved for it from the author's sketches and specimens. The majority of them are full-page photographic reproductions, and are beautifully executed; all add much to the value of the text.

The pen and scalpel are interchangeable instruments in Dr. Macewen's hands; both are used with ease and precision. The reports of cases, of which fifty-four are given in full, are models of graphic description, embodying all of the essentials of the case, but with no attempt at literary padding. The body of the work is a creditable production from a literary point of view, and demonstrates

the fact that the author, in addition to his extensive experience, his skill as an operator, and his habits of minute and painstaking observation, has the ability to express his knowledge in such a way that the book will, without doubt, take rank as a classic in this domain of surgery.

LECTURES ON SURGERY. By DAVID W. CHEEVER, A.B., M.D., Professor of Surgery, Emeritus, in the Medical School of Harvard University. 8vo, 591 pp. Boston: Damrell & Upham, 1894.

These interesting and instructive lectures were published from time to time during the past winter in the *Boston Medical Journal*, and are now collected and republished in book form. The subjects treated are limited in number, and the reader is told in the preface that the author's aim is not to present a complete treatise on surgery, for "this is only a portion of a surgical course which includes other teachers and varied departments."

The scope of the work is best indicated by the principal lecture-headings, which are as follows: anæsthetics, gunshot wounds, fractures, dislocations, frost-bite, and burns, and injuries to blood-vessels, head, spine, face, throat, and abdomen.

From the first the reader is impressed by the conservative and yet impartial manner in which Dr. Cheever presents the subjects to his class. Pope's maxim—

"Be not the first by whom the new is tried,
Nor yet the last to cast the old aside"—

could be placed at the beginning of the volume as an accurate index of the author's teaching and practice.

In the chapter first mentioned all of the principal forms of local and of general anæsthetics are described and given a fair hearing. The advantages and disadvantages of each are given, as well as the essentials for their safe administration. The mooted question of ether *vs.* chloroform is especially well argued, and, while the writer prefers ether for most purposes, chloroform is not submitted to the sweeping condemnation which seems to be thought necessary by many American surgeons.

The subject of gun-shot wounds is treated more fully than is usual in this particular era. "Although we are not in a time of war, yet they are very common in civil life." The civilian surgeons who accuse their military colleagues of performing needless amputations are met with the statement "that the person who looks at the problem from the side of civil life does not understand it. Probably too few rather than too many amputations are performed in time of war." A third of the volume is devoted to the allied subjects of fractures and dislocations.

In view of the fact that Dr. Cheever is one of the very few surgeons who has ever performed œsophagotomy more than once or twice, the lecture devoted to the subject of foreign bodies in the throat is of especial value. In the description of the operation for the removal of these, and, indeed, throughout the entire book, many practical details are accurately described which are too often left to the imagination of the reader who attempts to follow prescribed directions in many text-books.

To the members of the thirty-three medical classes to whom these lectures are inscribed, and who are fortunate enough to have heard them as well as to read them, the book must have a personal value apart from the amount of information that it contains. Thanks to the accurate report of the medical stenographer, Dr. Edwin H. Allen, the conversational style and personal characteristics of the author are reproduced with fidelity. With the text as a guide to their fancy, Harvard graduates, at least, can readily imagine themselves once more within the amphitheatre receiving instruction from the lips of their teacher, guide, and friend.

SURGERY. A Manual for Students and Practitioners. By BERN B. GALLAUDET, M.D. and CHARLES N. DIXON-JONES, B.S., M.D.
THE STUDENTS' QUIZ SERIES. Series edited by BERN B. GALLAUDET, M.D. Philadelphia: Lea Brothers & Co.

This volume of the Students' Quiz Series has as one of its authors the editor of the entire series. Dr. Gallaudet is especially

well fitted to write such a book, for his long experience as quiz-master and as a surgeon has brought him into contact with many graduates as well as medical students. He has had abundant opportunities to discover their needs, and to learn the best methods of presenting for purposes of study the practical as well as the theoretical side of modern surgical practice.

Dr. Charles N. Dixon-Jones has been associated with Dr. Galaudet in the preparation of the book, and the many important portions which are written by Dr. Dixon-Jones compare favorably with those of the senior author.

"Among the principles of surgery inflammation is one, the clear comprehension of which seems attended with peculiar difficulties. One of the main purposes has been to elucidate this subject fully." The classification adopted is different from the stereotyped one of the older writers, and embodies the most advanced idea of modern investigators. The relations, so far as known, of bacteria and of ptomaines to various inflammatory conditions are clearly described; the characteristic pathological changes are given; the treatment recommended in each case is sanctioned by its practical success; altogether, the chapter is the most satisfactory in the book.

The chapters devoted to fractures, dislocations, the circulatory system, and the abdominal viscera are also noteworthy. The various surgical procedures are clearly described, and the value of the text in all of these chapters is greatly enhanced by the large number of clear and accurate illustrations which are given.

Some of the shorter chapters are not so satisfactory. Thus the discussion of tumors and cysts, anæsthesia, and diseases of the female breast are all much shorter than the importance of the subjects would seem to require.

The best text-books and current literature have been made to pay tribute to the work, and the authors are to be congratulated upon having produced the best book in the entire series.

H. P. DE FOREST.

THE RESULTS OF OPERATIONS FOR THE CURE OF
CANCER OF THE BREAST PERFORMED AT
THE JOHNS HOPKINS HOSPITAL
FROM JUNE, 1889, TO JANU-
ARY, 1894.

By WILLIAM S. HALSTED, M.D.,

OF BALTIMORE,

PROFESSOR OF SURGERY IN JOHNS HOPKINS UNIVERSITY.

IN fifty cases operated upon by what we call the complete method we have been able to trace only three local recurrences.

Local recurrence is a return of the disease in the field of operation,—in the apparent or buried scar. The more extensive, therefore, the operation the more liberal our interpretation of local recurrence. Until it became the custom to remove in every case the contents of the axilla, a local recurrence was understood to be a return of the cancer in the apparent scar; but now that we regularly clean out the infraclavicular and usually the supraclavicular region and remove a part, at least, of the pectoralis major muscle, a return of the disease in any part of the explored regions should be considered a local recurrence. As *regionary recurrence* Billroth designated a return of the cancer in or about the scar "after a long time." Recurrences after so long a time¹ he regarded as growths *de novo* and as absolutely independent of the original growth. To explain these late recurrences he assumes a cancer diathesis, or that conditions favorable to the development of cancer have been furnished by the scar.

¹ The exact time he does not state, but he is inclined to regard a local recurrence after one and one-half year's freedom from the disease as an independent new growth.

The great frequency of these late local recurrences and the comparative infrequency of cancer of both breasts make one hesitate to accept Billroth's explanation of what he terms regionary recurrence. However this may be—and I shall revert to the subject later on—I prefer to reserve the term regionary recurrence for the skin metastases at a greater or less distance from the scar. When operating for cancer of the breast we cannot be responsible for undiscoverable metastases in the skin. For the principal growth, the axilla, the pectoral muscles, and the supraclavicular region,—in other words, for the scar in its fullest sense,—we should hold ourselves responsible; but for the eradication of the so-called lenticular and apparently discrete metastases of the skin we have no guide. One might literally flay the patient's chest and side only to find, a few weeks or months later, one or more cancer nodules in the skin of the neck or back or abdomen.

These lenticular skin metastases or regionary recurrences, furthermore, distinguish themselves from local recurrences in that they are believed to have formed against the lymphatic current and to have no connection either with the parent tumor or with each other.

Thanks to the most persistent efforts of my house-surgeon, Dr. Joseph C. Bloodgood, the result of the operation has been ascertained in all but two cases. The two unheard-from cases were classed at the time of the operation with the most favorable ones. Only those who have tried it can know what an amount of labor it represents to have traced in this country, and in this part of it, the subsequent histories of such a large percentage of so many cases.

Only one of the three local recurrences was inoperable. In one, suspicious granulations excised one month after the operation were on microscopical examination pronounced carcinomatous. The patient is now perfectly well, without local or regionary recurrence, two years and three months after the second operation. The third case developed internal metastases prior to the local recurrence, which latter appeared two years after the operation.

In eight cases there has been regionary recurrence (*vide*

Table I). Four of these cases are living and four are dead. Of the dead, one, No. 13 (cancer of both breasts), had an inoperable recurrence. Two, Nos. 4 and 12, were operated upon successfully so far as the regionary recurrence was concerned. The fourth case, No. 9, developed cancer of the pleura prior to the regionary recurrence, which latter did not appear until two years and four months after the operation. This is the only case of recurrence in the supraclavicular glands. It is classed as a regionary recurrence because, being one of the earlier cases, the supraclavicular region was not explored. Hereafter we shall consider supraclavicular recurrences as local, for we now think it advisable to explore and clean out the supraclavicular region in almost every operable case. Of the four living, three, Nos. 35, 40, and 46, have been operated upon for their regionary recurrences, and are now well and without recurrence one year and three months, eleven months, and three months respectively after the second operation. One case, No. 41, has operable skin metastases, but has an inoperable carcinoma of the femur.

So far as local and regionary recurrence is concerned, the result is known in all but 5 cases. In 34 (73 per cent.) of these there has never been a local or regionary recurrence. Twenty-four are living and 10 are dead. In 43 of the 46 cases (93 per cent.) there has been no true local recurrence. In other words, there has, as I have said, been a local recurrence in only three cases (6 per cent.). These statistics are so remarkably good that we are encouraged to hope for a much brighter, if not a very bright, future for operations for cancer of the breast.

The prognosis at the time of the operation was recorded as hopeless or unfavorable in 27 of the 50 cases of complete operation. In every one of the 50 cases some or all of the axillary glands were cancerous. It is stated in the histories of 17 cases that the highest infraclavicular gland was involved. In only 7 cases is it recorded that the highest glands were not involved. In half of the cases, unfortunately, the historian has neglected to give precise information as to the extent of the involvement of the axillary glands. The supraclavicular glands were cancerous in at least 5 (10 per cent.) of the cases.

The pectoral muscles may be involved and the prognosis still be good. Volkmann, many years ago, noted the great difference, prognostically, between involvement of the muscle by simple extension of the growth and invasion of the muscle by metastases.

It is probable, as Ludwig says, that cellular elements, when they have once entered the lymphatic vascular system of a muscle, are soon swept along in the lymphatic current by the muscle activity. Hence the extension of the carcinoma into the muscle acquires an accentuated significance. For it is possible that the cancer cells may at any moment be carried with startling rapidity from one end of the muscle to the other. Fortunately the muscle itself is not usually invaded. In Schmidt's report of 226 cases operated upon by Küster, the tumor was adherent to the underlying parts in only twenty-two cases. Not one of these cases was cured. But the muscle may be involved when the tumor is not adherent.

In cases of muscle involvement Volkmann has had the best results. But at the time of Sprengel's report only three cases in thirty-six were living, and one of these had internal metastases. I am not quite prepared to announce positively in what proportion of cases we have found the muscle to be involved, but hope to do so in the second part of this paper, which will be devoted chiefly to the consideration of the microscopical work. I can say this, however, that the muscle is less frequently involved than I at one time was led to believe from the microscopical examination of what I now regard as an unusual series of cases.¹

Many years ago, Volkmann offered an explanation for the fact that the carcinoma may lie in masses on the muscle and be adherent to its fascia and still not involve the muscle itself. He.

¹ In one winter it was my fortune to have three very small cancers of the breast to examine. They were so small that I could mount sections of the entire tumor on the ordinary German form of object-carrier. Two of these cancers had already invaded the muscle. The third had advanced to the muscle, but had been stopped by the pectoral fascia. Six years ago I exhibited before the Clinical Society of Maryland a section of one of these tumors. On this occasion I read a paper before the Society on the cure of breast cancer, and advocated the operation which I have since performed with such gratifying results.

believed that the lymphatic vessels spread themselves out in the fascia covering the pectoralis major muscle and do not follow the blood-vessels into the connective tissue septa between the muscle bundles; that there is not, as a rule, a free communication between the lymphatic system of the muscle and that of the fascia covering it. Haidenhain's observations support this theory of Volkmann's, and it is further strengthened, as Haidenhain says, by the physiological investigations of Ludwig and Schweigger-Seidel on the lymphatic vessels of fascia and tendon. These investigators have established the fact that there is an intricate net-work of lymphatic vessels on the surface of muscle and on the upper side of all fascias. The direction of the lymphatic current is from the muscle to the fascia, and not in the reverse direction. Injections pass readily in the former, but are impossible in the latter direction. So convinced was Volkmann of the accuracy of his observations and of the truth of his theory that he prescribed a method of operating which he followed until his death, and which has been adopted by almost every good surgeon up to the present time. In his "*Beiträge zur Chirurgie*," Volkmann wrote as follows: "I make it a rule never to do a partial amputation for cancer of the breast, but remove the entire breast even for the smallest tumors, and at the same time I take away a liberal piece of skin. The skin defect is, of course, very great when one operates in this manner, and the wound, in consequence, requires a long time for healing. Furthermore, in making the lower incision I cut right down to the pectoralis muscle and clean its fibres, as I would for a class-room dissection, carrying the knife parallel with the muscular fasciculi and penetrating into their interstices. The fascia of the muscle is, accordingly, entirely removed. I was led to adopt this procedure because, on microscopical examination, I repeatedly found when I had not expected it that the fascia was already carcinomatous, whereas the muscle was certainly not involved. In such cases a thick layer of apparently healthy fat separated the carcinoma from the pectoral muscle, and yet the cancerous growth, in places demonstrable only with the microscope, had shot its roots along the fibrous septa down between the fat lobules and had reached

and spread itself out in flat islands in the fascia. It seems to me, therefore, that the fascia serves for a time as a barrier, and is able to bring to a halt the spreading growth of the carcinoma." I quote Volkmann at such length because his operation is a classical one. His observations were accurate, and they have been confirmed in almost every detail by Haidenhain.

With reference to the involvement of the fat, which, in greater or less quantity separates the breast from the pectoral muscle, Haidenhain says, "I am firmly convinced from what I have seen that carcinomata, when they have actually made their way into the lymphatic channels, and such is usually the case, have invariably sent their outposts (*Vorposten*) at once to the surface of the muscle, no matter what the thickness of the layer of fat between breast and muscle may have been; in other words, that a tumor, however freely movable on the underlying parts, has almost certainly advanced as far as the surface of the muscle." The latter remains, as Volkmann has already observed, entirely healthy for a long time, and this is certainly no less remarkable. In only three of the eighteen cases placed by Küster at Haidenhain's disposition was the muscle invaded by the cancer.

A glance at the tables which I have made from the records of Bergmann, Billroth, Czerny, Fischer, Gussenbauer, König, Küster, Lücke, and Volkmann should convince one that the operation for the cure of breast cancer, as practised by the surgeons who have labored the most successfully for the mastery of the disease, is still a very imperfect one.

These tables have been made to determine the percentage of local recurrences after the operation for the cure of breast cancer. I am personally responsible for them, and publish them in full in order that authors who may be surprised at their own results may readily test the accuracy of my figures.

The efficiency of an operation is measured truer in terms of local recurrence than of ultimate cure. For some lives are rescued only by repeated operations for local recurrence, and others, free from local recurrence, are lost from internal metastases. Cures which have been effected by one operation should be distinguished from those which are the result of several opera-

tions; and deaths without local recurrence from those with such recurrence.

I wish that it had been practicable to separate the true local from the regionary recurrences in all of the tables. But the descriptions of the recurrences are sometimes so vague ("Recidiv," "Wiederum von Carcinom befallen," "Am Ende der Narbe nach dem Sternum zu") that I have not done so. Furthermore, the local recurrences are so greatly in excess of the regionary recurrences (of the latter alone there are very few) that it did not seem worth while to attempt to make this distinction.

Bergmann had local recurrence in at least 51 per cent., and not improbably in 60 per cent. of 114 cases operated upon between the autumn of 1882 and May, 1887. I venture to say *not improbably*, because of nineteen patients nothing is known except that they are dead. Eight patients whom I have tabulated as having no local recurrence survived the operation only seven and a half months (average time p. o.). Six cases died in from nine days to two months after the operation.

Billroth had local recurrences in 85 per cent. of 170 cases, from 1867 to 1876. *Vide* Table III.

Czerny, in 62 per cent. of 102 cases, from 1877 to 1886. *Vide* Table IV.

Fischer, in 75 per cent. of 147 cases, from 1871 to 1878. *Vide* Table V.

Gussenbauer, in 64 per cent. of 154 cases, from 1878 to 1886. *Vide* Table VI.

König, in from 58 to 62 per cent. of 152 cases, from 1875 to 1885. *Vide* Table VII.

Küster, in 60 per cent. of 228 cases, from May, 1871, to December, 1885. *Vide* Table VIII.

Lücke, in 66 per cent. of 110 cases, from 1881 to 1890. *Vide* Table IX.

Volkmann, in 59 per cent. of 131 cases, from 1874 to 1878. *Vide* Table X.

I believe that this is a fair exposition of the best work that has been done in the treatment of cancer of the breast. Many of these cases were operated upon before it had become a universal rule to systematically clean out the axilla. But each of the dis-

tinguished surgeons whose results I have tabulated recognized the fact that the axillary glands were usually involved, even when they could not be felt, and had made for himself a rule to explore the axilla in almost every case. Volkmann (Sprengel) and Gussenbauer were perhaps the first to suggest that it might be well to explore the axilla in every case, but Küster was the first to advocate the systematic cleaning out of the axilla.

Every one knows how dreadful the results were before the cleaning out of the axilla became recognized as an essential part of the operation. Most of us have heard our teachers in surgery admit that they have never cured a case of cancer of the breast. The younger Gross did not save one case in his first hundred. D. Hayes Agnew stated in a lecture, a very short time before his death, that he operated on breast cancers solely for the moral effect on the patients, that he believed the operation shortened rather than prolonged life. H. B. Sands once said to me that he could not boast of having cured more than a single case, and in this case a microscopical examination of the tumor had not been made. There are undoubtedly many surgeons still in active practice who have never cured a cancer of the breast. But occasional cures of breast cancer have in all times been observed by reliable surgeons. C. v. Siebold removed the breast and subsequently the contents of the axilla for cancer, and for many years after the second operation had opportunities to see his patient and to convince himself that there was no recurrence of the disease.

Nélaton reports several permanent cures after operation for breast cancer. Velpeau, from 187 women operated upon for breast cancer, knew of seven who had lived for from five to twenty years after the operation.

Pauli excised first one breast and then the other for cancer, and saw his patient eighteen years later.

Encouraged by these rare but positive cures, German surgeons, led by Volkmann, have for many years been earnestly at work on this problem. But no positive advance in the pathology of breast cancer, and no essential improvement in the operation for its cure has been made since Volkmann's contribution in

1875. Indeed, with one or two uncertain exceptions, there have been no results better than his so far as local recurrence is concerned.

As to ultimate results—permanent cures effected by the operation—we again look to Volkmann and accept, as every one does, but with some modifications, his views as to what shall be called a radical cure. I must quote again the lines which have so often been quoted: "I unhesitatingly make this statement for all cancers, that when a whole year has passed and the most careful examination can detect neither a local recurrence nor swollen glands, nor any symptoms of internal disease, one may begin to hope that a permanent cure may be effected; but after two years usually, and after three years almost without exception, one may feel sure of the result."¹

Billroth² thought that Volkmann expressed himself too cautiously, and said, "I think that one may express himself more boldly, and may declare that if the careful examination of an experienced surgeon detects no recurrence when one year has passed since the operation, one may be sure that there will be neither a local nor glandular recurrence, and may pronounce the patient as radically cured." Volkmann prophesied truer, for recurrences after one year are very common. Most surgeons have accepted Volkmann's views, and do not consider the disease as radically cured unless three years have passed since the operation. The best results after three years are as follows:

Bergmann (Eichel), 30.2 per cent.; Billroth (V. Winniwarter), 4.7 per cent.; Fischer (Henry), 9 per cent.; Gussenbauer (Fink), 16.7 per cent.; König (Hildebrand), 22.5 per cent.; Küster (Schmidt), 21.5 per cent.; Lücke (Dietrich), 16.2 per cent.; Volkmann (Sprengel), 14 per cent.

Volkmann's statistics seem to have some bearing on the question as to the advisability of removing in all cases the pectoralis major muscle. He excised the pectoralis major, and with it sometimes the minor, in thirty-eight cases. These were his

¹ Loc. cit., p. 325.

² Billroth, *Krankheiten der weiblichen Brustdrüse*. Handbuch der Chirurgie, Billroth and Lücke.

worst cases, cases in which one or both muscles were involved. They were sometimes hopeless and always more or less desperate. In only eleven of these cases was there recurrence in the scar; in seven there was regionary recurrence, and in thirteen there was neither local nor regionary recurrence. Four died from the effects of the operation. In three cases the result was unknown. Excluding deaths and unknown results (seven cases in all), there was a true local recurrence in only 35 per cent. of the cases in which the pectoralis major or major and minor muscles were removed. And in only 58 per cent. was there either local or regionary recurrence. Comparing these results with the 60 per cent. of local and regionary recurrences in the cases in which the pectoralis muscle was not removed (the milder cases), we are at a loss to explain them unless it be true that the excision of the pectoral muscle or muscles means altogether a more complete operation,—a more thorough removal of the fascia at the lower edges of the muscles and between the muscles, and a more radical cleaning out of the infraclavicular region. A large proportion of the recurrences occurred in hopeless cases. The comparatively large percentage of non-recurrence in such desperate cases is remarkable. I wish that there were time to consider the cases in detail. Any one interested in this subject would be rewarded for his labor if he should study these cases in the original.

If we may judge from the incomplete description of the operations, Volkmann is the only one, Billroth perhaps excepted, of the surgeons whose work we have considered who occasionally removed the pectoral muscle. I am at a loss to know how to explain this, for I operate not infrequently on cases in which the disease has involved at least the fat and areolar tissue between the muscles, if not one or both of the pectoral muscles.

Surely no one will question the fact that the comparatively good results in the operative treatment of breast cancer which the Germans are now getting are to be attributed to the systematic and comparatively thorough operation which they perform. But, excluding the great body of surgeons who, the world over, are improving their methods day by day, and occasionally curing cases of breast cancer, a thing which they had never done before,

the results of to-day are not very much better than Volkmann's were twenty years ago, if we base our calculations solely on the cases in which at the outset he performed the typical cleaning out of the axilla.

But Volkmann's operation is manifestly an imperfect one. It admits of the frequent division of tissues which are cancerous, and it does not give the disease a sufficiently wide berth.

Even if it were always possible to dissect a delicate layer of fascia (the so-called sheath) from the anterior surface of the pectoralis major muscle, it is surely a dangerous as well as an incomplete procedure whether the sheath is infiltrated with cancer or not. The manipulation of the tissues necessary for this nice dissection must often express cancer cells from the alveoli and lymphatic vessels even if one should be so fortunate as not to cut through the diseased tissues.

Why should we shave the under surface of the cancer so narrowly if the pectoralis major muscle or a part of it can be removed without danger, and without causing subsequent disability, and if there are positive indications for its removal?

The pectoralis major muscle, entire or all except its clavicular portion, should be excised in every case of cancer of the breast, because the operator is enabled thereby to remove in one piece all of the suspected tissues.

The suspected tissues should be removed in one piece (1), lest the wound become infected by the division of tissues invaded by the disease, or of lymphatic vessels containing cancer cells, and (2) because shreds or pieces of cancerous tissue might readily be overlooked in a piecemeal extirpation.

The operation which has been attended with such surprisingly good results in our hands is performed as follows:

(1) The skin incision is carried at once and everywhere through the fat.

(2) The triangular flap of skin, *ABC* (*vide* Plate I) is reflected back to its base line, *CA*. There is nothing but skin in this flap. The fat which lined it is dissected back to the lower edge of the pectoralis major muscle where it is continuous with the fat of the axilla.

(3) The costal insertions of the pectoralis major muscle are severed, and the splitting of the muscle, usually between its clavicular and costal portions, is begun, and continued to a point about opposite the scalenus tubercle on the clavicle.

(4) At this point the clavicular portion of the pectoralis major muscle and the skin overlying it are cut through hard up to the clavicle. This cut exposes the apex of the axilla.

(5) The loose tissue under the clavicular portion (the portion usually left behind) of the pectoralis major is carefully dissected from this muscle as the latter is drawn upward by a broad, sharp retractor. This tissue is rich in lymphatics, and is sometimes infiltrated with cancer (an important fact).

(6) The splitting of the muscle is continued out to the humerus, and the part of the muscle to be removed is now cut through close to its humeral attachment.

(7) The whole mass, skin, breast, areolar tissue, and fat, circumscribed by the original skin incision, is raised up with some force, to put the submuscular fascia on the stretch as it is stripped from the thorax close to the ribs and pectoralis minor muscle. It is well to include the delicate sheath of the minor muscle when this is practicable.

(8) The lower outer border of the minor muscle having been passed and clearly exposed, this muscle is divided at right angles to its fibres, and at a point a little below its middle.

(9) The tissue, more or less rich in lymphatics and often cancerous, over the minor muscle near its coracoid insertion is divided as far out as possible, and then reflected inward in order to liberate or prepare for the reflection upward of this part of the minor muscle.

(10) The upper, outer portion of the minor muscle is drawn upward (*vide* Plate II) with a broad, sharp retractor. This liberates the retractor which until now has been holding back the clavicular portion of the pectoralis major muscle.

(11) The small blood-vessels (chiefly veins) under the minor muscle near its insertion must be separated from the muscle with the greatest care. These are embedded in loose connective tissue which seems to be rich in lymphatics, and contains more

or less fat. This fat is often infiltrated with cancer. These blood-vessels should be dissected out very clean, and immediately ligated close to the axillary vein. The ligation of these very delicate vessels should not be postponed, for the clamps occluding them might of their own weight drop off or accidentally be pulled off; or the vessels themselves might be torn away by the clamps. Furthermore, the clamps, so many of them, if left on the veins, would be in the way of the operator.

(12) Having exposed the subclavian vein at the highest possible subclavicular point, the contents of the axilla are dissected away with scrupulous care, also with the sharpest possible knife. The glands and fat should not be pulled out with the fingers, as advised, I am sorry to say, in modern text-books and as practised very often by operators. The axillary vein should be stripped absolutely clean. Not a particle of extraneous tissue should be included in the ligatures which are applied to the branches, sometimes very minute, of the axillary vessels. In liberating the vein from the tissues to be removed, it is best to push the vein away from the tissues rather than, holding the vein, to push the tissues away from it. It may not always be necessary to expose the artery, but I think that it is well to do this. For sometimes, not usually, the tissue above the large vessels is infiltrated. And we should not trust our eyes and fingers to decide this point. It is best to err on the safe side and to remove in all cases the loose tissue above the vessels and about the axillary plexus of nerves.

(13) Having cleaned the vessels, we may proceed more rapidly to strip the axillary contents from the inner wall of the axilla,—the lateral wall of the thorax. We must grasp the mass to be removed firmly with the left hand, and pull it outward and slightly upward with sufficient force to put on the stretch the delicate fascia which still binds it to the chest. This fascia is cut away close to the ribs and serratus magnus muscle.

(14) When we have reached the junction of the posterior and lateral walls of the axilla, or a little sooner, an assistant takes

hold of the triangular flap of skin and draws it outward, to assist in spreading out the tissues which lie on the subscapularis, teres major, and latissimus dorsi muscles. The operator having taken a different hold of the tumor, cleans from within outward the posterior wall of the axilla. Proceeding in this way, we make easy and bloodless a part of the operation which used to be troublesome and bloody. The subscapular vessels become nicely exposed and caught before they are divided. The subscapular nerves may or may not be removed, at the discretion of the operator. Küster lays great stress upon the importance of these nerves for the subsequent usefulness of the arm. We have not as yet decided this point to our entire satisfaction, but I think that they may often be spared to the patient with safety.

(15) Having passed these nerves, the operator has only to turn the mass back in its normal position, and to sever its connection with the body of the patient by a stroke of the knife from *b* to *c*, repeating the first cut through the skin.

All that has been removed is in one piece (*vide* Plates I, II, and III). There are no small pieces nor shreds of tissue. I believe that we should never cut through cancerous tissues, when operating, if it is possible to avoid doing so. The wound might become infected with cancer either by the knife which has passed through diseased tissue, and perhaps carries everywhere the cancer-producing agents, or by the simple liberation of the cancer cells from their alveoli, or from the lymphatic vessels. The division of one lymphatic vessel and the liberation of one cell may be enough to start a new cancer.

This may explain some or all of the very late (from three to five or even more years) local recurrences which are not rarely met with. It is a more plausible theory, I think, than that offered by Billroth, of a cancer diathesis, and that conditions favorable to the development *de novo* of cancer are furnished by the scar. If the explanation which I suggest is the correct one, we should expect to find these very late recurrences somewhere in the field of operation rather than as lenticular metastases in the skin. And such is really the case. I have found thus far no positive instance

of recurrence as late as three years which was not in the scar in its broad sense. Of fifteen cases of recurrence after three years, not one is reported as having taken place primarily in the skin. One case (Gussenbauer, Case 71), the only one which might be construed as a late recurrence in the skin, was already an inoperable cancer *en cuirasse* when observed by the surgeon three years after the operation, and may have been an early and not a late recurrence.

Another argument in favor of this theory of inoculation is the following: When carcinomata have once begun to grow rapidly they continue to do so. The pace, if I may use the term, increases rather than decreases as the growth advances. The metastases of rapidly-growing carcinomata also increase rapidly in size; they seem to take the pace of the parent growth, although this is not invariably the case. We can readily understand why there should be exceptions to this rule. The metastasized cells may have the full virulence of the home cells, but may not at once find the conditions so favorable for their development.

The early local recurrence is probably always an uninterrupted growth so far as place is concerned, a direct continuation of the parent growth or its metastases. It makes its appearance very soon after the operation, and grows as fast as or faster than it was growing at the time of the operation. The lenticular metastases in the skin may appear in great numbers in a very short time, but the individual nodule grows slowly, and seldom attains a large size. The skin seems to offer a certain resistance to the growth of the cancer. Whether it does or does not offer this resistance, might we not expect to find these so-called late recurrences, occasionally at least, in the skin if they are always continuous growths? Consulting again our tables, we find that primary recurrences in the skin rarely, if ever, make their appearance as late as one year after the operation.

The operation, as we perform it, is literally an almost bloodless one. From the first to the last each bleeding point is stopped with an artery forceps as quickly as possible. When

practicable the vessels are clamped before they are divided. If no blood is lost, there is no perceptible shock from the operation. This is true of almost every operation. The symptoms which are so often ascribed to shock are due almost invariably to loss of blood. I have performed this operation for breast cancer on patients whose pulse before the operation was so feeble that the anæsthetizer and by-standers have pronounced it barely perceptible. As a rule, the pulse is little, if any, feebler after the operation than it was before it.

The edges of the wound are approximated by a buried purse-string suture of strong silk. Of the triangular flap of skin (*abc*) only the base is included in this suture. The rest of this flap is used as a lining for the fornix of the axilla. The apex of this flap is consequently shifted to a new and lower position. The axilla is never drained and invariably heals by first intention. The uncovered wound often heals by the so-called organization of the blood-clot.

Seventy-six operations (complete and incomplete) for breast cancer have been performed in the hospital, and not one death has resulted from the operation.

Twenty-six incomplete operations have been performed. Seven were incomplete because of the small size and recent appearance of the tumor. Four of these are living, one with a local recurrence. Two died with metastases,—one and perhaps both with local recurrence.¹

Nineteen operations were incomplete because of the magnitude of the growth and the hopelessness of the case. These operations were undertaken for the moral effect upon the patient, and were usually little more than an ablation of the greater part of the new growth.

As to the disability produced by the operation, it has in some cases been so slight as to be absolutely inappreciable. In most cases the arm of the side operated upon has been quite as useful as before the operation. Some of the patients, when questioned, complain that they cannot dress their back hair. This

¹ The seven incomplete operations probably furnished as many (three) local recurrences as the fifty complete operations.

disability is due to the loss of skin, and not to the loss of muscle. The cicatrix sometimes prevents the patient from raising the arm high enough to dress the back of the head. We have twice relieved this trouble by skin grafting. In no case that I know of has the disability of which the patient complained been due to the excision of the muscle or muscles. Occasionally there has been temporary swelling of the extremity.

If we permitted the arm to become glued to the side—and this would often happen if we did nothing to prevent it—there would be disability from fixation. We are careful therefore to secure a high axillary fornix. This is accomplished by means of the triangular flap of skin (*abc*) which is devoted almost entirely to this purpose, and which is held in place by a carefully-applied dressing. After all, disability, ever so great, is a matter of very little importance as compared with the life of the patient.

Furthermore, these patients are old. Their average age is nearly fifty-five years. They are no longer very active members of society. We should, perhaps, sacrifice many lives if we were to consider the disability which might result from removing a little more tissue here and there.

I sometimes ask physicians who regularly consult us why they never send us cancers of the breast. They reply, as a rule, that they see many such cases, but supposed that they were incurable. We rarely meet a physician or surgeon who can testify to a single instance of positive cure of breast cancer. The conscientious physician could not under the circumstances advise his patient to be operated upon, and he was justified in treating her with salves and internal remedies. But now we can state positively that cancer of the breast is a curable disease if operated upon properly and in time. I cannot emphasize too strongly the fact that internal metastases occur very early in cancer of the breast, and this is an additional reason for not losing a day in discussing the propriety of an operation.

Surgeons should practise this operation on the cadaver. It is not an operation that can be properly performed after two or three trials. We operate for cancer of the breast better now than we did last year, and we operated better last year than five years

ago. I have not had a local recurrence for more than three years.

Now that surgery is specialized to such an extent, surgeons have plenty of time to drill themselves in operating. They should not cast about for easy operations,—for operations that any one can do at any time and in any place. I think that surgeons will some day contemplate with astonishment some of the handy, happy-go-lucky methods for intestinal suture which are now so much in vogue.

CASE I.¹ (Surgical No. 12.)—L. S., aged thirty-eight; married; ten children. Menstruation on decline. Tumor of left breast for six months. Pain in breast and arm for two or three months. The tumor now occupies the entire breast and is adherent to the pectoral muscle. The nipple is retracted. There is a large abscess in the axilla. May 28, 1889, abscess in axilla opened. June 14, breast and part of the major pectoral muscle excised; axilla not cleaned out at this time because of suppurating wound. July 21, excision of scar, remainder of pectoral muscle and axillary contents, which later were very adherent to vessels. The glands of the axilla were carcinomatous. Very unfavorable case. Discharged in two weeks; wound healing well. May 11, 1889, granulating area excised and grafted with skin. No local nor regional recurrence when last observed, one year after first operation. Lived about one and a half years. Died of cancer of the other breast.

CASE II. (Surgical No. 177.)—M. J. J., aged thirty-nine; married; eight children. Menstruation more profuse and frequent since appearance of tumor. Cancer of left breast for five months. Growth has been very rapid during the last four weeks. Pain for four months in the affected breast. Now the pain is also in the axilla, shoulder, and arm. October 15, 1889, complete operation. Favorable case. Discharged in five weeks with healthy granulating wound. Lived three years and three months. Cause of death unknown. Written report says no recurrence.

CASE III. (Surgical No. 326.)—M. A., aged sixty-three; married; one child; menopause at thirty-five. Tumor of left breast observed for four years. Began, says patient, one year after an injury.

¹ I wish to express again my thanks to Dr. Bloodgood for the following abstract of the histories.

Five years ago noticed oozing of blood from left nipple, which continued for one year. Nipple then began to retract and a nodule appeared at its outer side. The pains, shooting in character, are sharp, but not constant. The tumor is hard and involves the nipple and the skin surrounding it. It moves freely on the pectoral muscle. The supraclavicular glands have been enlarged for the last two weeks. February 21, 1890, complete operation. Glands in axilla were small, carcinomatous, and very hard, but not adherent to the vessels. Regarded as favorable case. Discharged in three weeks with healthy granulating wound. Result unknown. Patient cannot be found.

CASE IV. (Surgical No. 360.)—E. S., aged fifty-three; married; ten children; menopause three years ago. Tumor, size of orange, of left breast for eleven months, attributed to injury. Began as small, hard lump in outer hemisphere. Pain for past week only. It resembles the pain of a needle prick. The nipple is not retracted. Skin not adherent. Tumor freely movable over muscle. Axillary glands cannot be felt. March 11, 1890, complete operation. Glands in axilla hard and small, but not adherent to the vessels. Considered favorable case. Patient discharged in two weeks with healthy granulating wound. June, July, 1892 (two years and four months after the operation), regionary recurrence. A small nodule in skin on the outer side of the scar; also enlarged supraclavicular glands. Second operation. Glands and nodule excised. Wound healed in three weeks. No local nor regionary recurrence. January 3, 1894, reported dead.

CASE V. (Surgical No. 385.)—M. A., aged twenty-seven; married; two children; one miscarriage; menstruation normal. Has lost flesh of late. Cancer of the left breast for nine months. Began as nodule in outer hemisphere. Rapid growth and much pain in breast and arm for past two months. The nipple is involved but not retracted. Pressure on breast expresses a rusty-colored fluid from nipple. Axillary glands enlarged. March 21, 1890, complete and satisfactory operation. Favorable case. Discharged in four weeks with healthy granulating wound. Died three years and seven months after operation; cause of death unknown.

CASE VI. (Surgical No. 388.)—S. C. D., aged sixty; widowed; menopause at forty-seven; two children; one miscarriage. Has pulmonary tuberculosis. Two and one-half years ago first noticed an enlargement of outer half of left breast. A few months later the nipple became sore. A few months ago enlarged glands were noticed

in the axilla. Since then has had much pain. March 27, 1890, operation as complete as possible. Glands not very large, but matted together and so adherent to the vessels and other parts that a clean dissection was almost impossible. Discharged in four and one-half weeks with healthy granulating wound. Died in two years and seven months of internal metastasis. Letter from friends does not mention local return.

CASE VII. (Surgical No. 624.)—F. A. W., aged fifty-three; married six years; childless; menopause one year ago. General health good. Tumor of the right breast for four months, following an injury. Cancer the size of hen's egg in the outer and upper quadrant of right breast. It is freely movable on underlying parts and not adherent to skin. The nipple is retracted. A few small hard glands are to be felt in the axilla. September 6, 1890, complete operation. Glands in axilla are embedded in large amount of apparently healthy fat. Prognosis very favorable. Discharged in three weeks with healthy granulating wound. November 10, 1890, wound is healed. March, 1894 (three years and seven months after operation), patient enjoys best of health. No signs of recurrence. Small painless cicatrix. There is no swelling of the arm and patient has good use of it.

CASE VIII. (Surgical No. 650.)—K. B., aged thirty-nine; married twelve years; one child; menstruation regular. Tumor of left breast for three months. Cyst size of hen's egg in upper and inner quadrant of left breast, four centimetres to left of sternum. It is freely movable under skin on underlying parts. Nipple not retracted. Axillary glands not palpable. October 2, 1890, cyst excised. On microscopical examination the walls of the cyst proved to be carcinomatous. October 11, 1890, complete operation. Patient discharged in two weeks with healthy granulating wound. March, 1894 (three years and six months after operation), patient in excellent health, no signs of recurrence. Good use of arm.

CASE IX. (Surgical No. 691.)—V. U., aged forty; married; six children; menstruation normal; general health good. Tumor of left breast for three months, appearing, says patient, two days after an injury. When first observed was the size of a hickory nut. Growth has been gradual and without pain. Cancer the size of a walnut, freely movable on underlying parts. Skin not adherent. Nipple not retracted. October 31, 1890, complete operation except for supraclavicular glands. Glands below clavicle involved. Prog-

nosis almost absolutely bad. November 18, 1890, granulations excised and skin grafted to hasten healing. Discharged in five weeks with wound entirely healed. April, 1892, well. No return in scar or axilla, but supraclavicular glands enlarged. March, 1893 (two years and five months after operation), patient in excellent health and spirits. March 15, 1893, shortness of breath. July, 1893, signs of carcinoma of left lung and pleura; arm and shoulder swollen. Skin nodules over right breast and in right axilla. No return in scar nor left axilla. January, 1894, three years and two months after operation, died from internal metastasis. No local recurrence.

CASE X. (Surgical No. 758.)—P. H., aged thirty-five; negress; married seventeen years; fourteen children; menstruation normal. Abscess in right breast during first lactation. General condition good. Tumor of right breast for nine months. Cancer now occupies entire breast. Nipple is retracted. Large glands in axilla. December 12, 1890, complete operation. Highest axillary and supraclavicular glands involved. Prognosis hopeless. Discharged in four and one-half weeks with healthy wound. Died with symptoms of internal metastasis in seven months. Neither local nor regional recurrence.

CASE XI. (Surgical No. 821).—Mrs. C., aged sixty-six; widowed. Maternal aunt died with cancer of the breast. Abscess in left breast with first lactation. Five months ago noticed pain in left breast, and then a tumor. Has now a cancer the size of a walnut in the upper and outer quadrant of the left breast. It is freely movable on the underlying muscle. Nipple slightly retracted. Skin not adherent. Axillary glands slightly enlarged. January 27, 1891, complete operation. Only a few enlarged glands in the axilla. Prognosis at operation favorable. Discharged in seven weeks with healthy granulating wound. July 6, 1891, five months after the operation, local recurrence. Small nodule at edge of scar of left breast. Fulness and diffuse induration in right breast, but no glands to be felt in the right axilla. Operation. Excision of a portion of the right breast for examination. Pathological report: nodule from scar carcinoma. Piece from right breast normal. February 17, 1892 (one year and one month after the first operation), diffuse recurrence in scar of left breast. Carcinoma of stomach. Sugar in urine. Excision of the recurrence attempted. Disease found to involve several of the ribs. Died of carcinoma of stomach in about one and one-half years after first operation.

CASE XII. (Surgical No. 978.)—M. Z., aged sixty-two; married; eight children. General health not good. Somewhat emaciated. Four years ago noticed three "pimples" under left nipple, which enlarged and ulcerated one year ago. Cancer now occupies centre of left breast. Nipple ulcerated. Glands can be felt in axilla. May 15, 1891, complete and satisfactory operation. Prognosis favorable. Discharged in four weeks with healthy granulating wound. October 20, 1891 (five and one-half months after operation), regionary recurrence. Small nodule in skin on the outer side of scar. No return in scar or axilla. Nodule excised. Reported dead. Cause and time (?) of death unknown. No mention of recurrence.

CASE XIII. (Surgical No. 1109.)—J. J., aged thirty-five; married; menstruating. Cancer of both breasts. One year ago patient detected painless nodule in left breast. She had not noticed the nodule in her right breast. The left breast is uniformly enlarged. Skin is adherent. Nipple retracted. Tumor movable on pectoral muscle. In the right breast is a small nodule. Skin not adherent to it. Nipple not retracted. Glands in both axillæ enlarged. August 6, 1891, complete and satisfactory operation on left side. September 25, 1891, complete operation on right side. Satisfactory dissection. Discharged November 15, 1891. No recurrence in wound or axilla, but skin metastases on both sides of chest. July, 1892 (eleven months after first operation), numerous metastases in skin of chest. Some ulcerating. General health quite good. No recurrence in scar nor axillæ. Four inoculations with pure culture of the streptococcus of erysipelas with negative results.

CASE XIV. (Surgical No. 1123.)—A. W., aged fifty-nine; colored; widowed. Thirty years ago patient noticed painless lump in left breast. Two years ago the tumor began to grow perceptibly. Since then patient has had intermittent pain in breast. The cancer is movable on the muscle. Skin adherent. Nipple retracted. August 13, 1891, complete operation. Part of pectoralis minor removed. Highest gland in axilla involved. Prognosis unfavorable. No nodules in muscle discoverable by microscope. March, 1894 (two years and six months), patient in good health. No local nor regionary recurrence.

CASE XV. (Surgical No. 1180.)—F. H. E., aged forty-one; married; two children; two miscarriages. Youngest child ten years old. One year ago lump noticed in upper hemisphere of left breast.

Pain during last ten days in breast and left shoulder, three weeks ulcerated. Cancer ulcerated, size of hen's egg, freely movable on muscle, but adherent to skin. Small glands to be felt in left axilla. September 16, 1891, complete operation. Prognosis very unfavorable. Discharged in four weeks. Patient died a few weeks after reaching home. No local nor regionary recurrence.

CASE XVI. (Surgical No. 1246.)—J. J. S., aged forty-five; married; seven children; two miscarriages; menstruation regular. Five years ago noticed small lump below right nipple. Pain for the last three months, intermittent, darting. Cancer below right nipple, size of a marble, tender, freely movable on pectoralis major muscle. Nipple retracted. Skin adherent. Axillary glands not palpable. October 22, 1891, complete operation. A few carcinomatous glands in axilla. Prognosis favorable. Microscopical examination. The cancer is a circumscribed one. A few epithelial masses in axillary glands. Patient discharged in four and one-half weeks. March, 1894 (two years and five months after operation), patient is perfectly well. Has no local nor regionary recurrence.

CASE XVII. (Surgical No. 1248.)—E. McG., aged forty-nine; widowed; seven children; one miscarriage; menstruation regular. Tumor above nipple of left breast for two years. For one year intermittent pains, ulceration of skin over tumor, and retraction of nipple. Cancer four by six centimetres in outer and upper quadrant of left breast. Movable on pectoralis muscle, but adherent to skin. Axillary glands enlarged. October 22, 1891, complete operation. Highest axillary gland involved. Nodule the size of a pea in the major pectoral muscle. No local nor regionary recurrence for two years, then return in scar. Died of internal metastases two years and four months after operation.

CASE XVIII. (Surgical No. 1255.)—E. E., aged fifty-four; married; four children; youngest child twenty-six years old; menopause four years ago. Five years ago patient noticed tumor of right breast. She attributes it to an injury sustained six years ago. Patient has a cancer in the upper and outer quadrant of the right breast. The nipple is retracted. The axillary glands are enlarged. October 27, 1891, complete operation. The highest gland of axilla is involved. Prognosis unfavorable. In four weeks a suspicious spot developed in the wound. This and the surrounding granulations were promptly excised. The microscopical examinations of the suspected granulations proved them to be carcinomatous. March, 1894 (two years and

four months after the operation), patient is very well, and has good use of the arm. There is no local nor regional recurrence.

CASE XIX. (Surgical No. 1337.)—J. E. T., aged sixty-two; married; no children; menopause several years ago. Forty-six years ago noticed small lump in the left breast, which caused no discomfort until two years ago, when it began to grow and to become painful. The entire left breast is now involved, but it is freely movable on the pectoral muscle. In the upper and outer quadrant of the breast is a mass of bony hardness. The axillary glands are palpable. December 15, 1891, complete operation. The highest infraclavicular gland was involved. Prognosis unfavorable. On examination of the excised breast a calcified fibroma is found near the outer edge of the tumor. Patient died in twenty-one months without local or regional recurrence.

CASE XX. (Surgical No. 1359.)—Aged thirty-seven; married three years; no pregnancies; menstruation irregular. Five weeks ago noticed nodule below left nipple. Has sharp intermittent pains. Cancer two by five centimetres below and to inner side of nipple, freely movable on pectoral muscle, and not adherent to skin. Nipple not retracted. Axillary glands not palpable. December 29, 1891, complete operation. Highest infraclavicular gland enlarged. Prognosis unfavorable. Discharged in two weeks. March, 1894 (two years and two months after operation), well. No local nor regional recurrence.

CASE XXI. (Surgical No. 1393.)—M. E. D., aged forty-two; married; thirteen children; menstruation regular; youngest child one year old. Four months ago noticed small, painful lump above left nipple. The pain has steadily increased. The cancer now involves most of the breast; is movable on the pectoral muscle, and not adherent to the skin. The nipple is not retracted. One gland can be felt in the axilla. January 19, 1892, complete operation. Highest infraclavicular gland involved. Prognosis unfavorable. Microscopic examination. Adeno-carcinoma of breast and microscopic metastases in glands. July, 1892 (six months after operation), well. April 27, 1894, patient presents herself for examination. Is perfectly well. No local nor regional recurrence. Good use of arm.

CASE XXII. * (Surgical No. 1429.)—E. T. O., aged sixty; widowed; five children; three miscarriages; menopause five years ago. Has had a lump in left breast for forty years, which has

given her no trouble until five months ago. Then noticed nodules in left axilla and below left breast. Eight weeks ago the latter became ulcerated, and the nipple became retracted. Patient has had no pain. Has a cancer the size of a walnut in the outer hemisphere of the left breast. The skin is inflamed and adherent to the tumor. There are regionary metastases in the skin from the nipple to the axilla. The glands of axilla are enlarged. February 11, 1892, complete operation. The pectoralis minor muscle was removed. The highest infraclavicular glands were involved, and there were cancerous nodules in the pectoralis major muscle. Discharged in four weeks with healthy granulating wound. June, 1892, necrosed rib excised at bottom of small granulating wound. August, 1892 (six months after operation), died of internal metastases. No local nor regionary recurrence.

CASE XXIII. (Surgical No. 1532.)—S. A. L., aged sixty-four; married; four children; menopause twelve years ago. One year ago a small lump, accompanied by darting intermittent pains, appeared in the left breast. Nine months ago the nipple became retracted, and the pain became great in the axilla. Cancer in outer hemisphere of left breast, size of an egg, hard, movable on muscle, and not adherent to skin. A few small hard glands can be felt in the axilla. April 1, 1892, complete operation. Highest infraclavicular gland involved. Prognosis unfavorable. Discharged in two weeks. March, 1894 (one year and eleven months after the operation), well. Almost perfect use of arm. No local nor regionary recurrence.

CASE XXIV. (Surgical No. 1560.)—M. F., aged forty-two; married; menstruation normal. Eighteen months ago, at end of last lactation, had pain in right breast. Then noticed lump under skin. Has cancer now size of an orange, hard, adherent to skin, and to pectoral muscle. Nipple retracted. Enlarged glands in axilla. April 21, 1892, complete operation. Prognosis hopeless. Died in eleven months. (Local ret.?)

CASE XXV. (Surgical No. 1635.)—M. C., aged fifty-six; widowed; six children. Eight months ago noticed lump in skin in left axillary line, which ulcerated three months later, following application of caustic. Cancer twelve by nine centimetres. Ulcer six by three centimetres. Axillary glands enlarged. May 31, 1892, complete operation. Prognosis unfavorable. Pectoral muscle not involved. March, 1894 (one year and ten months after operation),

well. No local nor regionary recurrence. Good use of arm, which is somewhat swollen.

CASE XXVI. (Surgical No. 1676.)—A. J. A., aged fifty-four; widowed. Four months ago noticed tumor, size of walnut, just above nipple. Skin is adherent. Nipple retracted. Axillary glands palpable. June 21, 1892, complete operation. Prognosis favorable. March, 1894 (one year and nine months after operation), well, good use of arm. No swelling of arm. No local nor regionary recurrence.

CASE XXVII. (Surgical No. 1677.)—E. McC., aged sixty-one; married. A few weeks ago noticed pain and a small lump in left breast. Cancer the size of a pigeon's egg, movable on pectoral muscle, adherent to skin. Nipple retracted. Axillary glands enlarged. June 21, 1892, complete operation. Prognosis favorable. Patient not heard from since discharged.

CASE XXVIII. (Surgical No. 1710.)—L. S., aged sixty-six; married. Three weeks ago noticed a small, painless nodule in left breast. Has cancer in upper and outer quadrant of left breast. It is hard and adherent to skin, but movable on pectoralis major muscle. The nipple is retracted. The axillary glands are not palpable. July 15, 1892, complete operation. Prognosis favorable. The highest infraclavicular glands were cancerous, but very small. The pectoral muscle was not invaded by the cancer. March, 1894 (one year and seven months after the operation), well. Good use of arm. Chops wood with it. No local nor regionary recurrence.

CASE XXIX. (Surgical No. 1718.)—C. B. K., aged sixty-two; widowed; one child. Abscesses in both breasts during lactation, thirty years ago. Four months ago noticed soreness in left nipple, and a few days later a lump above the nipple. Cancer, now the size of a duck's egg, chiefly below but embracing nipple. Movable on muscle. Nipple retracted and fissured. Bleeds easily. A large mass of glands in the axilla. July 16, 1892, complete operation. Prognosis favorable as to local recurrence. Died in ten months from internal metastases. No local nor regionary recurrence.

CASE XXX. (Surgical No. 1729.)—M. S. J., aged sixty; negress; widowed; two children; menopause twenty years ago. Four months ago noticed shooting pains and tumor in right breast. One month ago the skin ulcerated at the inner side of the nipple. The cancer now occupies the entire breast. It is hard, and not freely movable on muscle. There is an excavated ulcer one inch to the

inner side of the nipple. Large, hard glands to be felt in the axilla. July 29, 1892, complete operation. The highest infraclavicular gland is involved. Prognosis very unfavorable. December, 1893 (one year and five months after operation), well. No local nor regionary recurrence. Good use of arm.

CASE XXXI. (Surgical No. 1736.)—J. S., aged sixty; married; nine children. Two years ago pain in right breast and shoulder. Breast was swollen for a short time. Pain and swelling disappeared. Three months ago pain began in right axilla. Three weeks noticed lump in right breast. Cancer now occupies outer and lower quadrant of right breast. It is ill-defined, hard, intimately associated with the gland, movable on the pectoral muscle, and not adherent to the skin. The nipple is slightly retracted. There is a hard mass of glands in the axilla. August 5, 1892, complete operation. Highest infraclavicular gland involved. Tumor adherent to the pectoral major muscle. March, 1894 (one year and seven months after the operation), well. No swelling and good use of arm. Soft scar. Skin movable on underlying parts. No local nor regionary recurrence.

CASE XXXII. (Surgical No. 1782.)—M. E. C., aged fifty-four; married; eight children; six miscarriages; menopause five years ago. One year ago noticed a small lump in left breast. Ulceration supervened very soon. Cancer twelve by thirteen centimetres in upper outer quadrant. A fungoid mass projects from the ulcer. September 7, 1892, complete operation. Cancer circumscribed. Remainder of breast and the pectoral muscle normal. Some of the axillary glands show metastases. Prognosis favorable as to local recurrence. Dead in ten months. No local nor regionary recurrence.

CASE XXXIII. (Surgical No. 1819.)—M. H., aged forty-six; married; one child, ten years old; menopause five years ago. One year ago noticed nodule size of a pea in the right breast. Growth of tumor has been slow. Five months ago the skin became adherent and discolored. Six weeks ago the skin ulcerated. Has had intermittent pains from the beginning. Cancer six centimetres in diameter in the upper hemisphere of right breast. It is freely movable on the muscle. Axillary glands not palpable. September 23, 1892, complete operation. Axillary glands small, hard, and slightly adherent to the vessels. Prognosis unfavorable. March, 1894 (one year and five months after the operation), no swelling, and good use of arm. Patient works hard. Has no local nor regionary recurrence.

CASE XXXIV. (Surgical No. 1835.)—M. McA., aged fifty; married. Three years ago noticed lump near right nipple. Ulceration began four months ago. Cancer now occupies the centre of the right breast, below the nipple. There is an ulcerating area at the outer side of the nipple from which projects a fungoid mass. The axillary glands are enlarged. September 30, 1892, complete operation. The minor pectoral muscle also removed. Glands very adherent to the vessels. Clean dissection. Prognosis unfavorable. Died in three and one-half months after the operation. No local nor regionary recurrence.

CASE XXXV. (Surgical No. 1875.)—E. Z., aged sixty-nine; married; four children; youngest, thirty-eight years. Three months ago noticed a small nodule in the left breast. No pain. Rapid growth. Cancer two by three centimetres in upper and outer quadrant of left breast. It is nodular, freely movable on the pectoral muscle, but adherent to the skin. Nipple slightly retracted. A few glands to be felt in the axilla. October 27, 1892, complete operation. Highest infraclavicular gland involved. Prognosis unfavorable. Discharged in four weeks. January, 1894 (thirteen months after the operation), died of internal metastases. No swelling, and good use of arm. No local or regionary recurrence.

CASE XXXVI. (1903.)—Aged fifty-nine; married; seven children. Eight months ago noticed a small nodule in the left breast. Tumor has grown very little since first noticed. Patient has had very little pain. Cancer in upper and outer quadrant of left breast, adherent to skin. A few small glands to be felt in the axilla. November 8, 1892, complete operation. Prognosis favorable. Discharged in four weeks. January, 1894 (thirteen months after the operation), died of internal metastases. No swelling, and good use of arm. No local nor regionary recurrence.

CASE XXXVII.—K. A., aged thirty-four; married; two children; youngest child eight years old; menstruation regular. Seven months ago patient noticed two small lumps not larger than beans in the upper part of the right breast. The tumors have been enlarging slowly. For the past three months the patient has had sharp intermittent pains in the right breast. There is a small tumor three centimetres in diameter above the right nipple. The nipple is not retracted and the tumor is freely movable under the skin and on the muscle. One small gland is to be felt in the axilla. February 27, 1893, complete operation. The history says that the pectoralis major

muscle was divided but not removed. Inasmuch, however, as not a trace of the muscle is to be felt, I conclude that the historian must have made a mistake and that the operation was a complete one. May 3, 1894, patient presents herself for examination. She is perfectly well and has good use of the right arm. There is no local nor regionary recurrence, one year and two months after the operation.

CASE XXXVIII. (Surgical No. 2070.)—L. B., aged forty-six. Two years ago noticed small nodule in the right breast. Slow growth. Pains moderate and intermittent for the last six months. Cancer in the upper hemisphere of the right breast the size of a pigeon's egg. It is hard, nodular, freely movable on the pectoral muscle and not adherent to the skin. Nipple retracted. A few small hard glands to be felt in the axilla. February 21, 1892, complete operation. Prognosis favorable. Discharged in five weeks with healthy granulating wound. March, 1894 (one year after the operation), well. Good use and no swelling of arm. No local nor regionary recurrence.

CASE XXXIX. (Surgical No. 2107.)—M. Y., aged forty-six; married. Seventeen years ago noticed very hard lump in the right breast. At first there were shooting and intermittent pains. There are none now. Retraction of the nipple began three months ago. Cancer of the right breast occupies half of the outer hemisphere. It is movable on the pectoral muscle, but very adherent to the skin. Nipple retracted. Very large glands to be felt in the axilla. March 16, 1893, complete operation. The highest infraclavicular glands are involved. Prognosis unfavorable. Discharged in five weeks. March, 1894 (one year after the operation), well. No swelling, and good use of arm. No local nor regionary recurrence.

CASE XL. (Surgical No. 2166.)—S. C. S., aged forty-three; married. Five years ago noticed a small lump in left breast which was painful on pressure. For two years the growth has been very slow. For the last year the growth has been very rapid. A severe pain extends down the arm. For the last few months has not been able to lift the arm. Cancer now occupies the entire left breast. It is attached to the pectoral muscle and is adherent to the skin. The nipple is retracted. Glands to be felt in the axilla. April 15, 1893, complete operation. The highest infraclavicular gland is involved. Prognosis unfavorable. Discharged in four weeks. November 29, 1893 (seven months after operation), regionary recurrence. Enlarged

supraclavicular glands; also skin metastases at the outer side of scar. No local recurrence. Glands and skin nodules excised. March, 1894, well. No local nor regionary recurrence.

CASE XLI. (Surgical No. 2256.)—Mrs. O., aged forty-six; widowed; one child; menstruating. Four years ago noticed lump in left breast. The growth has been rapid for the last two years. Nipple became retracted eighteen months ago. Glands to be felt in axilla. Large cancer in outer hemisphere of left breast. May 22, 1893, complete operation. Supraclavicular glands removed. The highest infraclavicular gland involved. Prognosis unfavorable. Discharged in seven weeks. September, 1892, complains of pain in the left hip and walks with cane. Readmitted with fracture of femur, probably caused by bone metastases. December 16, 1893 (seven months after operation), skin metastasis noticed at the outer side of scar. Three in skin over shoulder. March, 1894, the skin metastases have enlarged very little and have increased in number. The enlargement of the femur continues. There is no return in scar, axilla, or supraclavicular region. No local recurrence. The regionary recurrence is easily operable. Operation contraindicated by cancer of femur.

CASE XLII. (Surgical No. 2339.)—M. P., aged sixty-five; widowed; seven children. Eleven months ago noticed lump in the left breast. Pain has been present for six months. Small cancer in upper and outer quadrant of left breast. Skin not involved. Nipple not retracted. One small gland to be felt in the axilla. Patient says it has been there for fifteen years. September 8, 1893, complete operation. The highest infraclavicular gland is not involved. The breast nodule is circumscribed. The remainder of the gland and muscle apparently uninvolved. There are microscopic metastases in the axillary glands. March, 1894 (seven months after the operation), well. No local nor regionary recurrence.

CASE XLIII. (Surgical No. 2517.)—A. S., aged forty-four; single. Two years ago noticed lump outside of right nipple. Retraction of nipple observed three months ago. Continuous pain from beginning. Cancer five by three centimetres in the outer and upper quadrant of right breast. Adherent to nipple and to skin near nipple. Movable on the muscle. A few glands to be felt in the axilla. October 6, 1893, complete operation. The highest infraclavicular gland not involved. Prognosis favorable. March, 1894 (four and one-

half months after the operation), no local nor regionary recurrence.¹

CASE XLIV. (Surgical No. 2565.)—S. G., aged sixty; married; ten children. Five years ago injured right breast. Three months later a small lump appeared in the upper part of this breast. Severe pain extended to the shoulder and down the right arm. The cancerous nodule is at the outer border of the breast over the pectoral muscle. It is adherent to both skin and muscle. The nipple and remainder of breast apparently uninvolved. A few small glands can be felt in the axilla. October 20, 1893, complete operation. The pectoralis minor muscle also removed. Prognosis unfavorable because of the infiltration of both pectoral muscles. March, 1894 (three months after the operation), well. No local nor regionary recurrence.

CASE XLV. (Surgical No. 2594.)—P. B., aged forty; colored; widowed; three children. Five months ago noticed small lump in the left breast. Pain at first, but none now. Cancer five by five centimetres in upper and outer quadrant of left breast. Freely movable on muscle. A few small glands to be felt in the axilla. November 2, 1893, complete operation. Highest infraclavicular gland involved. Prognosis unfavorable. Cancerous nodule invades the fascia of the pectoralis muscle. March 15, 1894 (three and one-half months after operation), well. No local nor regionary recurrence.

CASE XLVI. (Surgical No. 2614.)—M. T., aged twenty-nine; married; one child; child four months old. Tumor of right breast, noticed two months ago. This breast gives more milk than the other. Cystic tumor occupies the upper and inner quadrant of the right breast, which is painful and tender. The tumor cannot be outlined from the remainder of the gland. Skin and nipple apparently normal. Axillary glands not palpable. November 11, 1893, operation. Incision revealed cyst filled with cheesy serum, resembling sero-pus. Piece of the wall excised for examination found to be malignant cystic-adenoma. November 17, 1893, complete operation. Pectoral muscle and axillary glands show no metastasis. December 6, 1893, small lenticular nodule in skin at lower and outer side of scar. Nodule excised. March, 1894, no local nor further regionary recurrence.

¹ April 4, 1894, recurrence in scar and axilla six months after operation. April 7, 1894, operation for recurrence. The axillary recurrence was in a gland near the apex of the axilla and adherent to the axillary vein. Neither operation was performed by me.

CASE XLVII. (Surgical No. 2628.)—P. S., aged sixty-four; male. Twenty years ago injury in breast. Has been tender and painful ever since this injury. Fifteen years ago noticed nodule near left nipple. Has now a cancer about two and one-half centimetres in diameter in the inner and upper quadrant of the left breast. Nipple, skin, and pectoralis major muscle are involved. November 16, 1893, complete operation. Highest infraclavicular gland not involved. Prognosis favorable. Microscopical examination. Cancer is circumscribed, but invades pectoral fascia and muscle. The axillary glands show metastasis. Tissue from apex of axilla normal. March, 1894 (three and one-half months after operation), well. No local nor regionary recurrence.

CASE XLVIII. (Surgical No. 2654.)—S. M. D., aged forty-three; married; no children. Ten months ago noticed tumor of left breast. Pain and discomfort for first four months. Has now a small, hard cancerous nodule in the inner and upper quadrant of the left breast. Breast is movable on muscle. Skin slightly adherent. Nipple not retracted. Numerous miliary skin metastases surrounding nipple. A few palpable glands in axilla and above clavicle. November 20, 1893, complete operation. Highest infraclavicular gland not involved. Prognosis favorable. March, 1894 (three months after operation), well. No local nor regionary recurrence.

CASE XLIX. (Surgical No. 2739.)—J. R., aged thirty-three; single; menstruation normal. One year ago attention drawn to tumor by a rusty-colored serous discharge from right nipple. Pain, which began one month ago, now radiates to the right shoulder. Small tumor of inner and upper quadrant of right breast. It is nodular, freely movable on muscle, and not adherent to skin. Nipple slightly, if at all, retracted. Axillary glands not palpable. September 12, 1893, operation. Excision of a cyst with suspicious wall. Microscopical examination of the wall. Cystic adenoma. Intracystic papillomatous growths. Here and there earliest stages of carcinoma. February 2, 1894, complete operation. Prognosis is most favorable. Only one cancerous gland found in the axilla. March 20, 1894 (two months after the operation), no recurrence. This patient has also a myoma of the uterus.

CASE L. (Surgical No. 2791.)—E. B., aged fifty-four; married; two children. Carcinoma of the cervix uteri removed by vaginal hysterectomy six months ago. Tumor of left breast, noticed four weeks ago. Darting pains. Cancer in outer hemisphere size



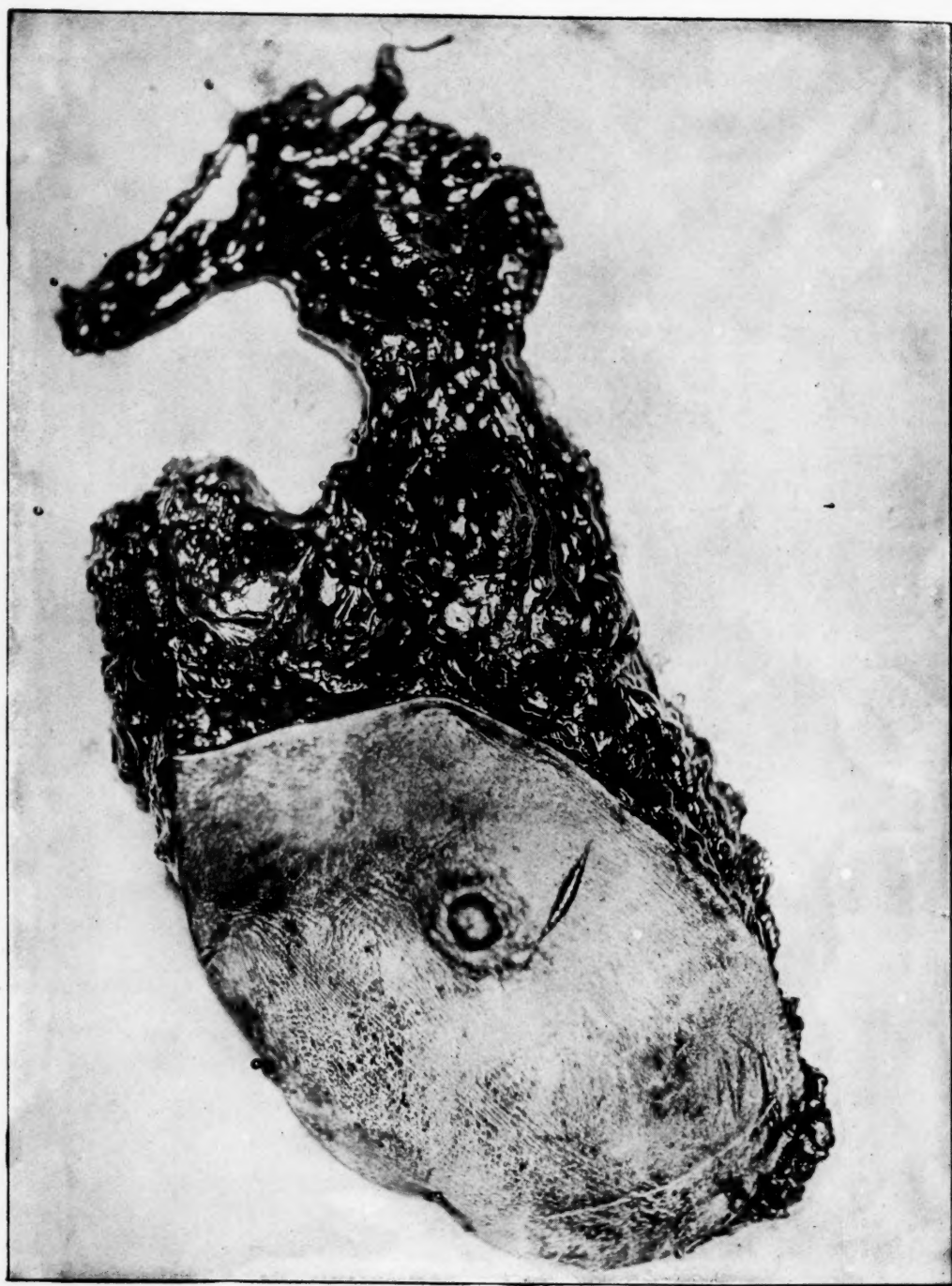


PLATE IV.

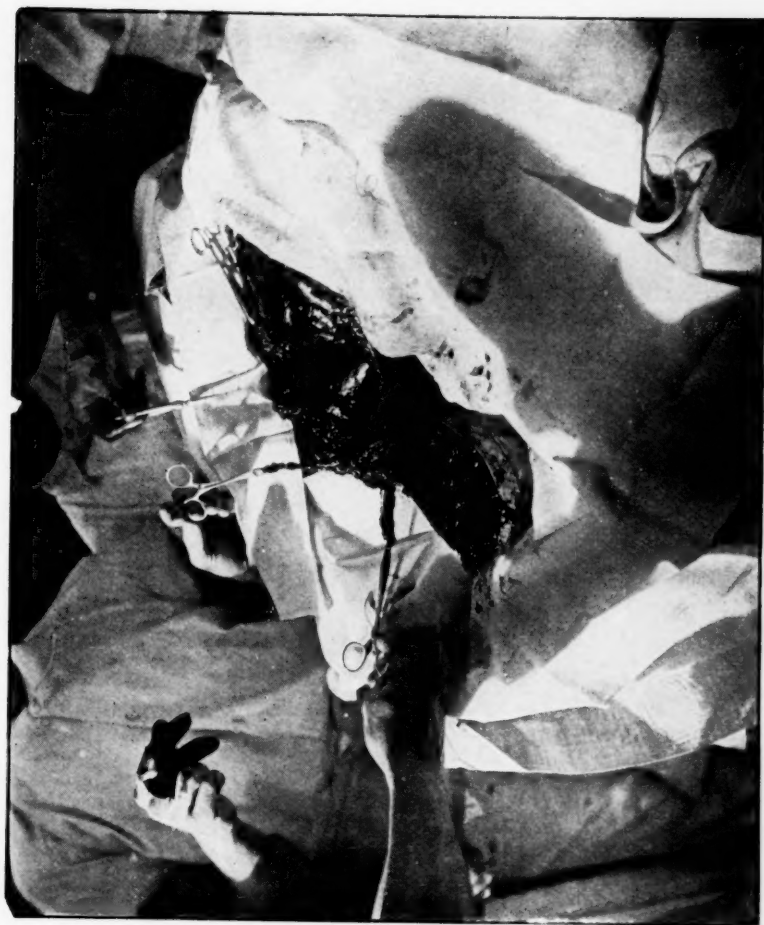


PLATE III.

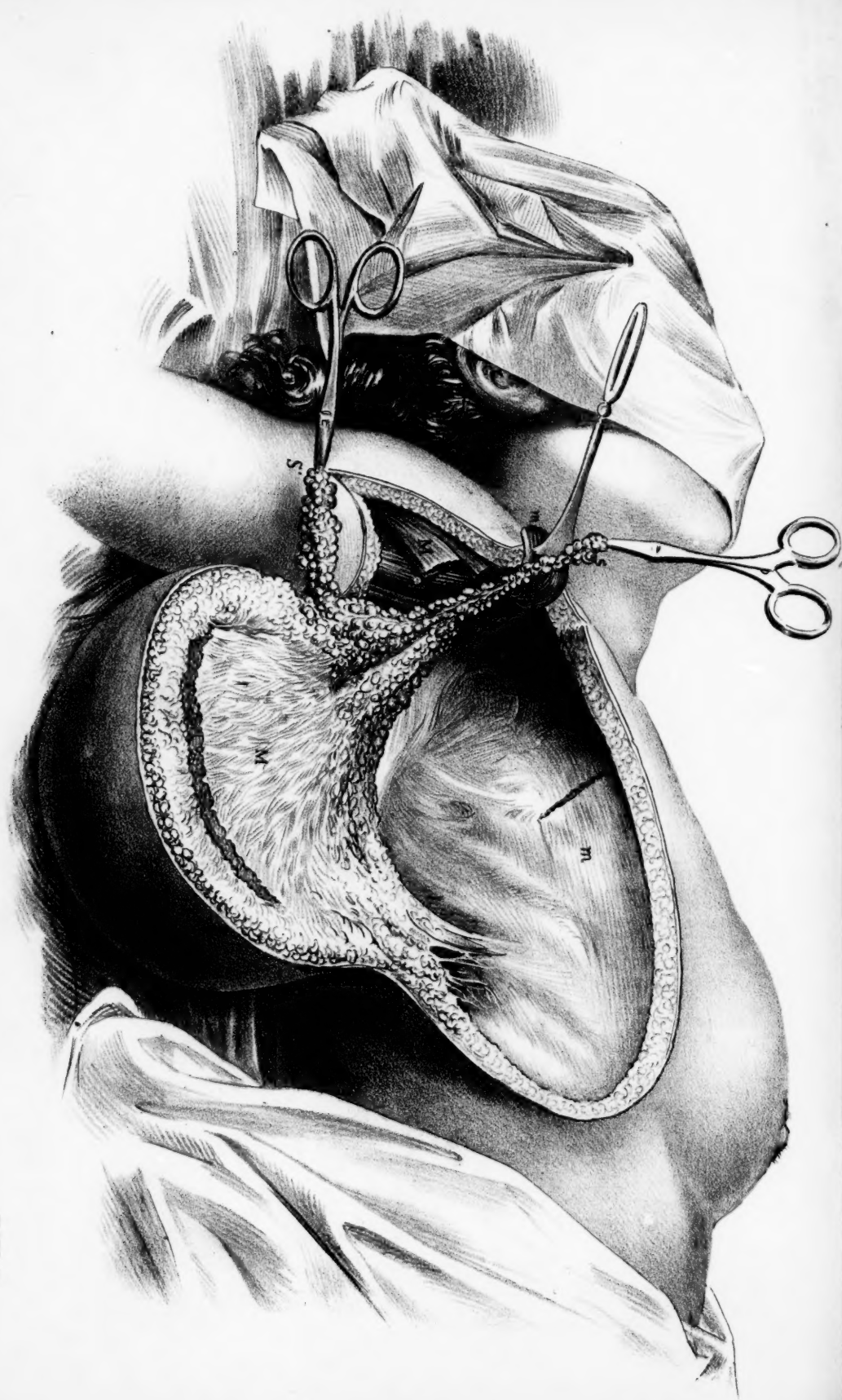
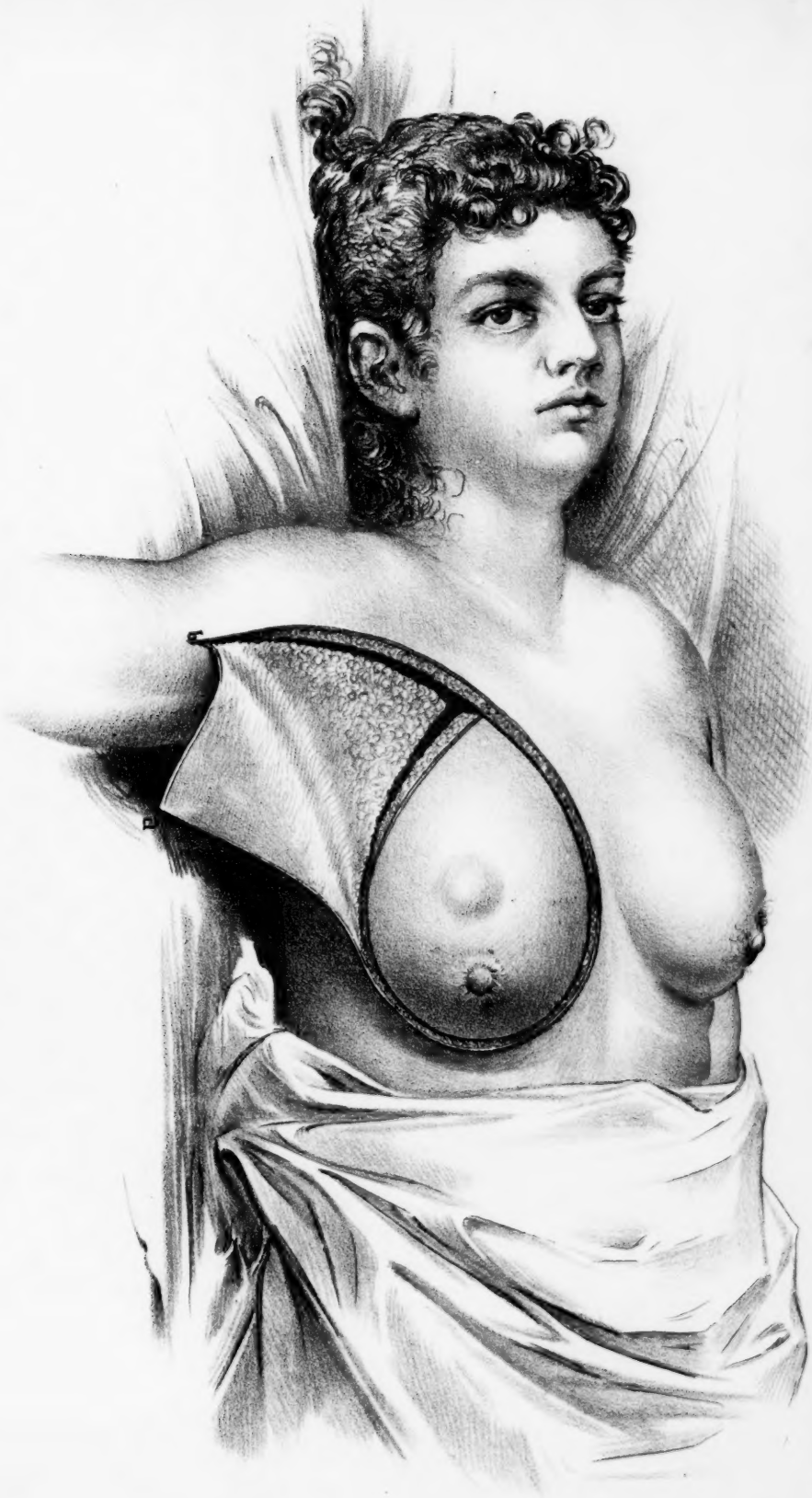
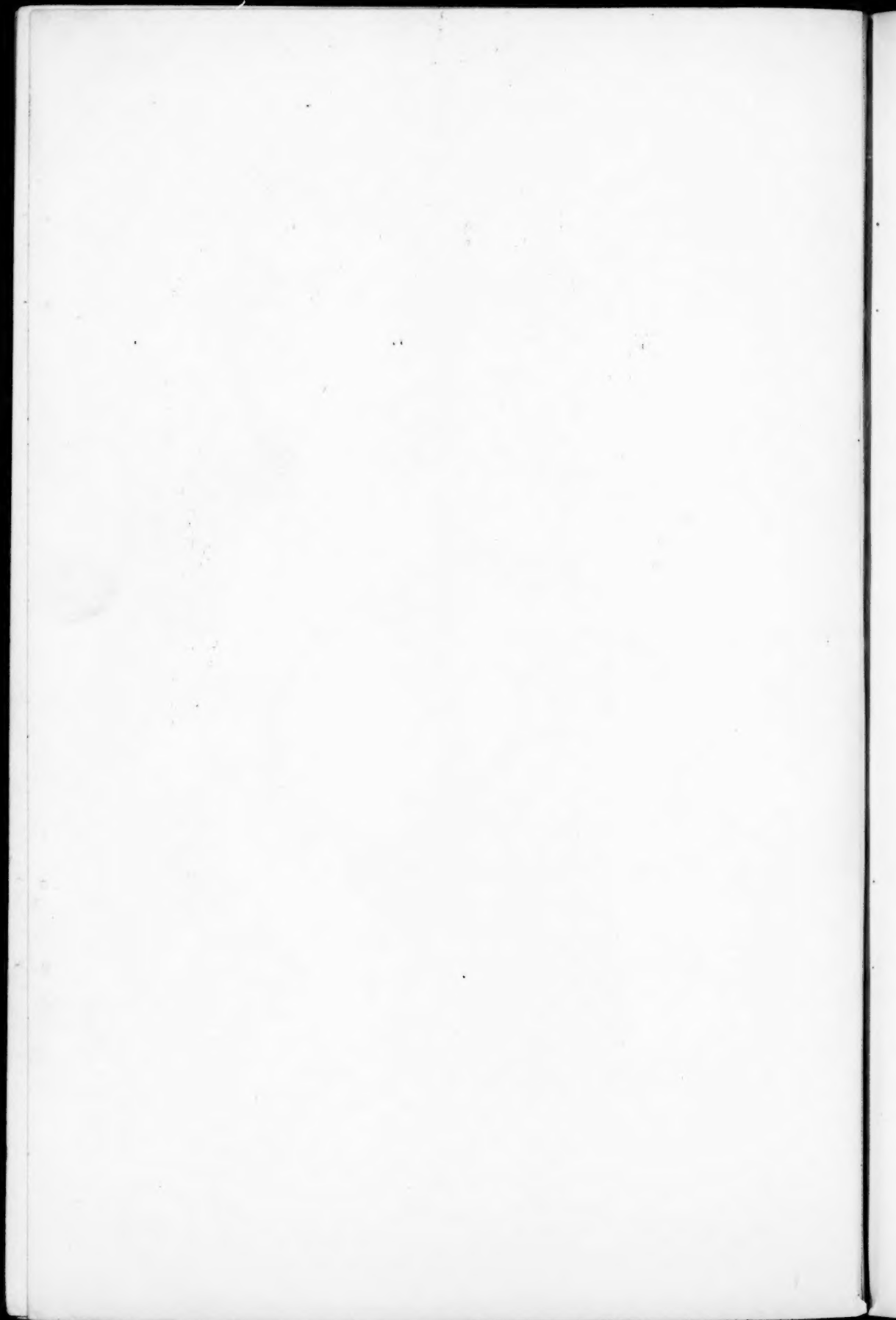


PLATE II.





of a hen's egg. Freely movable on muscle. Very hard and nodular. Not adherent to skin. Nipple slightly retracted. One small, hard gland to be felt in the axilla. February 2, 1894, complete operation. Prognosis very favorable. Highest infraclavicular gland not involved. March 20, 1894, no local nor regionary recurrence.

EXPLANATION OF THE PLATES.

Plate I.—Diagram showing skin incisions, triangular flap of skin, *abc*, and triangular flap of fat.

Plate II.—Diagram to elucidate Plate III. *M*, major pectoral muscle; *m*, minor pectoral muscle; *S*, apex of infraclavicular fat below the subclavian vessels; *S'*, apex of fat above the vessels.

Plate III.—Photograph of field of operation, taken just before the final cut which severs from the body the mass which has been extirpated.

Plate IV.—Photograph of the excised mass. The cancer was very small, and the glands, although involved, could not be felt before the operation.

TABLE I.—WM. S. HALSTED, JOHNS HOPKINS HOSPITAL, 1889-94.
Fifty Cases.

Special No.	Surgical No.	LOCAL RECURRENCE, 6 PER CENT.	Special No.	Surgical No.	REGIONARY RECURRENCE.
11	821	Scar. Five months post-operat. Second recurrence hopeless. Died carc. ventriculi one and a half years.	4	360	Skin and supraclav. gl. two and a third years post-operat. Excised successfully. Four years post operat. reported dead.
17	1248	Scar. Two years post-operat. Nodule in pect. major at first operation Died two years and four months, internal metastases.	9	691	Supraclavicular glands. Lenticular metastases in skin over opposite breast and in opposite axilla two years four months. † Three years and two months post-operat.
18	1255	Scar. One month post-operat. Excised successfully. Well. No recurrence two years and four months post-operat.	12	978	One small nodule in skin outer side of scar five and a half months post-operat. Excised, presumably successfully. Dead. No local nor regionary recurrence reported.
			13	1109	Cancer both breasts. Multiple skin nodules one and a half months. One year post-operat., no local recurrence.
			35	1875	Nodule under skin six months. Excised. Well. No recurrence one year and three months.
			40	2166	Skin nodules outside of scar seven months post-operat. Excised. Well. No recurrence eighteen months post-operat., eleven months after second operation.
			41	2256	Operable skin nodules outside of scar seven months post-operat. Living. Carc. femur.
			46	2614	Nodule in skin lower and outer side of scar three months post-operat. Excised. Well. No recurrence three months after second operation.

† Died.

TABLE I.—HALSTED. (Concluded.)

NO LOCAL RECURRENCE.						Special No.	Surgical No.	Results as to Local Recurrence Unknown.	Special No.	Surgical No.	Cases Unheard From.
Special No.	Surgical No.	Living.	Special No.	Surgical No.	Living.						
7	624	3 yrs. 7 mos. p. o.	1	12	1½ years.	5	385	† 3 years	3	326	Favorable case.
8	650	3 yrs. 6 mos.	2	177	3 yrs. 6 mos.			7 mos.			
14	1123	2½ years.	10	758	7 months.	6	388	† 2 years	27	1677	Favorable case.
16	1246	2 yrs. 5 mos.	15	1180	2 months.			7 mos.			
20	1359	2 yrs. 2 mos.	19	1337	1 yr. 9 mos.	24	1560	† 11 mos.			
21	1393	2 yrs. 2 mos.	22	1429	6 months.						
23	1532	1 yr. 11 mos.	29	1718	10 months.						
25	1635	1 yr. 10 mos.	32	1782	10 months.						
26	1676	1 yr. 9 mos.	34	1835	3½ months.						
28	1710	1 yr. 7 mos.	36	1903	13 months.						
30	1729	1 yr. 7 mos.									
31	1736	1 yr. 7 mos.									
33	1819	1 yr. 5 mos.									
37	2064	1 yr. 2 mos.									
38	2070	1 year.									
39	2107	1 year.									
42	2439	7 months.									
43	2517	4½ months.									
44	2565	3½ months.									
45	2594	3½ months.									
47	2628	3½ months.									
48	2654	3 months.									
49	2739	2 months.									
50	2791	2 months.									

† Died.

TABLE II.—CLINIC OF VON BERGMANN,¹ 1882-87. 114 Cases.

LOCAL RECURRENCE, FROM 51 TO 60 PER CENT.			DIED SOON AFTER THE OPERATION.		
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.
35	Scar, axilla, infra- and supraclav. gl.	Both soon after operation.	51	Carc. liver and lungs.	2 months.
36	{ (1) Recurrence supraclav.		56	Carc. pleura.	2 "
37	{ (2) Recurrence.		85	Cause unknown.	2 "
37	Scar in neck, infra- and supraclav. glands.	1 year 6 mos.	106	" "	9 days.
38	Scar and axilla.	10 months.	107	Ulcers ventriculi.	11 "
39	Supraclav. and scar.	3 "	108	Pleuritis, suppurative.	14 "
40	Supraclav.	9 "	109	Cause unknown.	28 "
	Scar.	9 "	110	" "	23 "
41	Scar, supraclav.	4 "			
42	Scar.	3 "			
43	Axilla, scar, right and left supraclav. glands.	1 month.			
44	" Local recurrence."	Soon after discharge.			
46	Scar, supraclav.	Soon after discharge.			
59	Scar.	1 year.			
60	Scar, supraclav.	9 months.			
62	Scar.	6 "			
64	Scar.	Immediately.			
66	" Local recurrence."	1 month.			
67	" Local recurrence." Supraclav. gl.	6 months.			
69	Scar and supraclav. glands.	4 "			
70	Scar.	10 "			
71	Scar.	18 "			
72	Scar.	3½ "			
74	Scar and axilla.	6 months after operation.			
75	Scar, axilla, and supraclav. glands.	2 months.			
77	Scar.	1 month.			
79	Scar.	9 months.			
80	" Local recurrence."	9 "			
82	Scar.	5 "			
84	Skin near scar.	2 "			
87	Scar.	Soon after op.			
88	Axilla.	7 months.			
91	Scar and supraclav. glands.	Soon after op.			
92	Scar.	17 mos. after op.			
93	Scar.	5 months.			
95	Scar.	18 "			
96	Scar, axilla, and supraclav. glands.	Soon after op.			
97	" Local recurrence," also supraclav. glands.	Few weeks after operation.			
99	Scar, infraclav.	5 weeks.			
101	Scar.	Soon after op.			
102	Scar.	3 months.			
103	Scar.	Few weeks after operation.			
104	Scar.	Very soon after operation.			
94	" Local and regionary recurrence."	4 months.			
98	" Local and regionary recurrence."				
45	" Recidiv."				
105	Scar and supraclav. glands.				

¹ Eichel. Ueber die in der Von Bergmann'schen Klinik von Herbst, 1882, bis Mai, 1887, operirten primären Fälle von Brustkrebs. Inaug. Diss., Berlin, 1887.

TABLE II.—VON BERGMANN. (Concluded.)

NO LOCAL RECURRENCE.		RESULT AS TO LOCAL RECURRENCE UNKNOWN.		RESULT UNKNOWN.
No.	Time Post-Operat.	No.	Time Post-Operat.	
1	4 years 9 months.	61	† Less than 1 year.	III
2	4 " 1 month.	63	†	III2
3	4 " 2 months.	65	†	III3
4	4 " 2 "	73	† 1 year 2 months.	III4
5	4 " "	50	† 5 months.	
6	3 " 10 months.	54	† 6 "	
7	3 " 9 "	68	† 2½ years.	
8	3 " 6 "	76	†	
9	3 " 9 "	78	†	
10	3 " 3 "	81	†	
11	3 " 1 month.	86	†	
12	3 " 2 months.	90	†	
13	2 " 10 "	83	†	
14	2 " 10 "	89	†	
15	2 " 7 "	100	†	
16	2 " 2 "			
17	2 "			
18	1 year 11 months.			
19	1 " 3 "			
20	1 " 2 "			
21	1 " 1 month.			
22	11 months.			
23	1 year 5 months.			
24	11 months.			
25	6 "			
26	6 "			
27	6 "			
28	6 "			
29	7 "			
30	3 "			
31	3 "			
32	2 "			
33	2 "			
34	3 years 6 months.			
47	† 9 months.			
49	† 8 "			
53	† 6 "			
58	† 4 "			
48	† 11 "			
55	† 4 "			
52	† 1 year 2 months.			
57	† 5 months.			

TABLE III.—CLINIC OF BILLROTH,¹ 1867-76. 170 Cases.

LOCAL RECURRENCE, 82 PER CENT.		
No.	Situation.	Time Post-Operat.
34	Scar.	Immediately.
62	Skin near scar.	Two days.
63	Scar.	Very soon.
64	Miliary nodules near scar.	One month.
65	Axilla.	One month.
66	"Local recurrence."	?
67	"Local recurrence."	About one year.
68	(1) Middle of scar.	Six and a half months.
	(2) Axilla.	One year.
69	Scar and granulating wound.	Very soon.
70	Skin near scar.	Very soon.
71	Scar.	Two months.
72	(1) Scar.	Four months.
	(2)	Ten months.
73	Scar.	
74	Supraclav. glands.	?
75	"Local recurrence."	?
76	Skin and axilla.	?
77	Near scar.	Two months.
78	"Local recurrence."	Soon after discharge.
79	Near scar.	Soon after healing.
80	Near scar.	Soon after healing.
81	Infraclav. glands.	Two months.
82	Skin some distance from scar.	Before complete healing.
83	In scar.	Soon after healing.
84	"Local recurrence."	Soon after discharge.
86	Near scar.	Two years.
87	Scar and axilla.	Three and a half years. ?
88	Supraclav. glands.	Soon after healing.
89	Near scar.	Very soon.
90	Skin, pectoral muscle, and axilla.	During healing.
92	(1) Near scar.	One year.
	(2) Axilla.	Three and a half years. ?
93	Granulating wound.	
94	"Local recurrence."	?
95	Near scar.	One and a half years.
97	Near scar.	Soon after discharge.
98	"Local recurrence."	Very soon.
99	Axilla and edge scar.	Few months.
100	Infraclav. glands.	Very soon.
101	Near scar and axilla.	Soon after discharge.
102	(1) Near scar and axilla.	Soon after discharge.
	(2)	Soon after second operation.
103	Near scar.	Soon after discharge.

¹ A. von Winniwarer. Beiträge zur Statistik der Carcinome. Stuttgart, 1876.

TABLE III.—BILLROTH. (Continued.)

LOCAL RECURRENCE, 82 PER CENT.		
No.	Situation.	Time Post-Operat.
104	Axilla and near scar.	Four weeks after discharge.
106	Axilla and near scar, below scar.	Soon after operation.
107	Scar.	Soon after healing.
108	Scar.	Soon after discharge.
109	(1) Scar.	Eighteen months.
	(2) Axilla.	Thirteen months.
110	Scar.	Soon after healing.
111	Near wound before healing.	
112	Scar.	Eight months.
113	Breast during healing.	
114	Scar.	Nine months.
115	Axilla below scar.	One and a half months.
116	Skin and axilla.	Soon after healing.
117	Axilla near scar.	Soon after healing.
119	(1) Axilla.	Sixteen months.
	(2) Scar.	Twenty-two months.
122	(1) Near scar.	About three years.
	(2) In scar and skin.	Six months later.
124	Axilla.	Immediately.
	(2) Lower edge of pectoral muscle.	Four and three-quarters years.
125	(1) Skin, supraclav. and infraclav. gland, and axilla.	About three years.
	(2) Skin and axilla.	Six years.
130	Axilla and extirpated.	Immediately.
131	Axilla and infraclav. glands.	Immediately.
132	Scar and axilla.	Thirteen months.
133	Scar and lower edge of pectoral muscle.	One year.
136	(1) Skin.	Three months.
	(2) Scar and axilla.	Five years.
137	Scar.	Few months.
138	Axilla.	One year.
141	(1) Scar, axilla, infraclav. and supraclav. glands.	One year.
	(2) Scar, infraclav. and supraclav. glands.	One and a half years.
	(3) Scar and near axilla.	Two years.
143	Scar.	Three months.
146	Breast and axilla.	Three months.
148	Scar and axilla.	Seven months.
153	Scar.	One year.
155	(1) Scar.	Two years.
	(2) Axilla.	Four years.
159	(1) "Local recurrence."	Immediately.
	(2) Breast.	Six years.
164	(1) Scar.	One month.
	(2) Scar and axilla.	Three months.
165	(1) Above scar.	Four months.
	(2) Scar.	Five months.

TABLE III.—BILLROTH. (Concluded.)

DIED SOON AFTER THE OPERATION.			NO LOCAL RECURRENCE.		RESULT UNKNOWN.
No.	Cause of Death.	Time Post-Operat.	No.	Time Post-Operat.	No.
28	Septicæmia.	10 days.	120	3 years.	91
29	Pyæmia.	37 "	154	5 " 9 months.	118
30	"	22 "	156	3 " 3 "	121
31	"	12 "	157	6 " 1 month.	123
32	"	11 "	158	3 " 8 months.	126
33	Erysipelas.	16 "	160	2 " 2 "	127
35	Septicæmia.	3 "	162	2 " 1 month.	128
36	Pyæmia.	8 "	163	3 " 5 months.	129
37	Septicæmia.	Day of operation.	167	2 "	134
38	Erysipelas.	11 days.	168	1 year 1 month.	135
39	Septicæmia.	7 "	169	5½ months.	139
40	Erysipelas.	12 "	166	3½ "	142
41	"	32 "	170	4 years 3 months.	144
42	Pyæmia.	16 "	140	† 1 year 11 months.	145
43	"	11 "	161	† 1 year.	147
44	Erysipelas.	12 "			148
45	Septicæmia	14 "			150
L.	Peritonitis.	13 "			151
47	Erysipelas.	7 "			
48	Hæmorrhage axilla artery.	7 "			
49	Erysipelas.	41 "			
50	Septicæmia.	2 "			
51	Erysipelas.	7 "			
52	"	39 "			
53	Erysipelas and pneumonia.	12 "			
54	Erysipelas.	10 "			
55	"	37 "			
56	"	28 "			
57	Marasmus following erysip.	63 "			
58	Erysipelas.	16 "			
59	Hæmorrhage axilla artery.	6 "			
60	Pleuritis.	1 day.			
61	Erysipelas.	8 days.			
152	Acute "internal disease."	Soon after discharge.			

TABLE IV.—CLINIC OF CZERNY,¹ 1877-86. 102 Cases.

LOCAL RECURRENCE, 60 PER CENT.			DIED SOON AFTER THE OPERATION.		
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.
1	Scar.	3 months.	6	Erysipelas.	18 days.
3	Scar.	5½ years.	26	Erysipelas.	11 "
5	Scar.	8 months.	44	Erysipelas.	13 "
7	Scar.	3 months.	45	Iodoform poisoning.	23 "
8	Axilla.	4 years.			
9	Suture holes, skin, muscle, supraclav. gl.	4 months.			
10	Scar, supraclav. glands.	1 month.			
11	Lenticular recurrence of entire side.	6 months.			
17	Scar, supraclav. and cervical glands.	2 years.			
18	Scar.	3 months.			
20	Scar and axilla.	2 months.			
21	Axilla.	1 year.			
	Scar.	12½ years.			
29	Scar and axilla.	3¾ years.			
31	Scar and axilla.	3 months.			
33	Axilla and pect. muscle.	3 months.			
	Scar.	3 years.			
34	Scar.	4 months.			
35	Scar.	7 "			
36	Scar and axilla.	3 "			
38	Lenticular recurrence about scar.	8½ "			
43	Scar.	3½ "			
	Axilla.	1 year.			
46	Axilla.	2½ years.			
48	Scar and axilla.	1 year.			
50	Axilla.	11 months.			
53	Scar.	5 months.			
	Axilla.	Later.			
61	Scar.	1 month.			
64	Scar.	5 months.			
68	Scar.	7 "			
72	Scar.	2 "			
74	Scar.	1 month.			
83	Scar.	6 weeks.			
86	Scar and axilla.	1½ years.			
88	Scar and axilla.	4½ months.			
91	Lenticular in skin.	2 "			
92	Above scar.	3 "			
96	Lenticular recurrence about scar.	8 (?) "			
99	Scar.	6 "			
102	Scar.	2 "			
	Axilla.	7 "			

¹ G. B. Schmidt. Die Geschwülste der Brustdrüse, Beiträge zur klinischen Chirurgie, Bd. IV, 1889.

TABLE IV.—CZERNY. (Concluded.)

NO LOCAL RECURRENCE.		NO NOTE AS TO LOCAL RECURRENCE.			RESULT UNKNOWN.
No.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.
5	9½ years.	13	Enlarged axillary glands not removed at operation.	†	4
12	† 1¼ years.	25		† 1 year.	12
16	† 1 year.	47		† 1 year 9 months.	14
22	7 years.	51	Carc. ventriculi.	† 11 months.	19
23	† 3 "	52		† 4 months.	27
24	† 7 "	54		† 1 year.	28
32	7 years 2 months.	55	Carc. other breast.	† 1 year.	30
40	† 5½ months.	57		† 6 or 8 months.	37
49	5 years 7 months.	59		† 3 months.	39
70	4 " 3 "	60		† 2 years.	41
77	3 " 10 "	66		† 3 months.	56
79	1 year 10 "	73		† 6 "	58
80	4 years 5 "	75		† 10 "	62
81	† 4 months.	76		† 7 "	63
84	4 (?) years.	78		† 1½ years.	65
89	1 year 8 months.	94		† 7 months.	67
90	1 " 8 "	98	Pleuritis.	† Less than 1 year.	69
93	1 " 7 "				72
97	1 " 1 month.				81
100	2 (?) years.				82
109	2 (?) years.				87
					98

TABLE V.—CLINIC OF H. FISCHER,¹ 1871-78. 147 Cases.

LOCAL RECURRENCE, 75 PER CENT.			DIED FROM THE OPERATION, OR TOO SOON TO EXCLUDE LOCAL RECURRENCE.			NO LOCAL RECURRENCE.		RESULT UNKNOWN.
No.	Situation.	Time after Operation.	No.	Cause of Death.	Time after Operation.	No.	No.	
15	Scar.	9 months.	109	Exhaustion.	Few weeks.	1	8 1/4 years.	111
19	Scar and axilla.	15 months.	118	General carcinoma.	4 weeks.	2	7 3/4 years.	114
26	Scar.	18 "	119	Pyæmia.	1 week.	3	7 years.	115
29	"Recurrence" probable.	18 "	120	Croupous pneumonia.	1 month.	4	6 years.	116
30	Scar and axilla.	28 "	121	Anæmia.	1 "	5	6 years.	117
31	Scar.	8 "	122	Septicæmia.	1 month.	6	5 years.	
32	Scar.	12 "	123	Pyæmia.	1 month.	7	4 1/2 years.	
33	Scar and supraclav. glands.	18 "	124	Acute peritonitis.	15 days.	8	4 1/2 "	
34	Scar.	18 "	125	Pyæmia.	8 "	9	3 3/4 "	
35	Scar and axilla.	7 "	126	Erysipelas.	18 "	10	3 3/4 "	
36	Scar.	11 "	127	... ..	A few weeks.	11	3 3/4 "	
37	Scar and skin.	18 "	128	Edema of the lungs.	4 days.	12	3 1/4 "	
38	Scar and axilla.	3 "	129	Septicæmia.	2 "	13	2 1/2 "	
39	Scar.	12 "	130	Pleuritis.	34 "	14	2 1/4 "	
40	Scar, neck, and skin.	18 "	131	Inanition.	2 months.	16	1 3/4 "	
41	(1) Skin and axilla.	6 "	132	Septicæmia.	8 days.	17	1 1/2 "	
42	(2) Scar.		133	Pyæmia.	A few days.	18	1 1/2 "	
43	Scar.		134	Pyæmia.	22 days.	20	1 year.	
44	Scar and skin.	9 "	135	Septicæmia.	10 "	21	1 "	
45	"Recurrence."	3 "	136	Erysipelas.	12 "	22	1 "	
46	Axilla, skin, and under pectoral muscle.	5 "	137	Erysipelas.	4 "	23	9 months.	
47	Scar and sternum.	30 "	138	Pyæmia.	18 "	24	1 year.	
48	"Recurrence."	18 "	139	Septicæmia.	6 "	25	9 months.	
49	Scar.	3 "	140	Gangrene.	6 "	27	4 years.	
50	"Recurrence."	6 "	141	Erysipelas.	40 days.	28	6 months.	
51	Scar.	9 "	142	Erysipelas.	2 weeks.	107	6 months.	
52	Scar.	6 "	143	Diphtheria.	4 days.	113	2 years.	
53	Scar.	6 "	144	Septicæmia.	9 days.			
54	Scar.	6 "	145	Apoplexy.	48 days.			
55	Scar.	3 "	146	Fatty heart.	3 weeks.			
			147	Meningitis.				

¹ Arthur Henry. Statistische Mittheilungen über der Brustkrebs, 1871-78, Inaug. Dissert., Breslau, 1879.

TABLE V.—FISCHER. (Continued.)

LOCAL RECURRENCE, 75 PER CENT.		DIED FROM THE OPERATION, OR TOO SOON TO EXCLUDE LOCAL RECURRENCE.			No LOCAL RECURRENCE.		RESULT UNKNOWN.
No.	Situation.	Time after Operation.	No.	Cause of Death.	Time after Operation.	No.	
56	" Recurrence."	Less than one year.					
57	" Recurrence."	3 months.					
58	" Recurrence."	6 "					
59	Axilla.	9 "					
60	" Recurrence."	6 "					
61	" Recurrence."	12 "					
62	Axilla.	28 "					
63	Scar.	3 "					
64	" Recurrence."	Few weeks.					
65	" Recurrence."	6 months.					
66	" Recurrence."	9 "					
67	" Recurrence."	3 "					
68	Axilla.	6 weeks.					
69	" Recurrence."	3 months.					
70	Scar.	6 months.					
71	Scar.	9 "					
72	" Recurrence."	3 "					
73	" Recurrence."	6 "					
74	Skin.	6 "					
75	Scar.	6 weeks.					
76	" Recurrence."	3 months.					
77	Supraclav. glands.	6 months.					
78	Scar.	Few weeks.					
79	Scar.	3 "					
80	Scar.	6 months.					
81	Skin.	Few weeks.					
82	" Recurrence."	6 months.					
83	Scar.	3 "					
84	Axilla and supraclav. glands.	9 "					
85	Scar.	2 "					
86	Scar.	12 "					
87	Scar.	9 "					
88	" Recurrence."	6 "					

TABLE V.—FISCHER. (Concluded.)

LOCAL RECURRENCE, 75 PER CENT.		DIED FROM THE OPERATION, OR TOO SOON TO EXCLUDE LOCAL RECURRENCE.			No LOCAL RECURRENCE.		RESULT UNKNOWN.
No.	Situation.	Time after Operation.	No.	Cause of Death.	Time after Operation.	No.	
89	" Recurrence."	6 months.					
90	" Recurrence."	6 "					
91	Scar.	Few weeks.					
92	Scar and axilla.	12 months.					
93	Scar and axilla.	6 "					
94	Scar.	3 "					
95	Axilla.	15 "					
96	" Recurrence."	12 "					
97	Scar and axilla.	3 "					
98	" Recurrence."	3 "					
99	Scar and axilla.	Few weeks.					
100	Scar.	3 months.					
101	Scar.	3 "					
102	Scar.	2 "					
103	Skin.	6 "					
104	Scar and axilla.	6 "					
105	" Recurrence."						
106	Scar.						
108	Scar and axilla.	Few weeks.					
110	Scar.	3 months or less.					
112	Scar and axilla.	9 "					
		8 "					

TABLE VI.—CLINIC OF GUSENBAUER.¹ 151 Cases.

LOCAL RECURRENCE, 64 PER CENT.			DIED SOON AFTER THE OPERATION.			NO NOTE AS TO LOCAL RECURRENCE.			NO LOCAL RECURRENCE.		RESULT UNKNOWN.
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.	Time Post-Operat.	No.	Time Post-Operat.	No.	
38	Scar two places.	10 months.	33	Sepsis and pneumonia.	1 month.	54	† Carc. lungs and vertebræ.	68	† 2 years.	176	
39	Scar.	2 "	34	Pneumonia.	21 days.			92	† 1 year.	179	
40	Recurrence.	12 "	35	Died on operating-table.		59	† Carc. sternum.	94	† 1½ years.	180	
41	Scar.	7 "						96	† 6 months.	181	
42	Recurrence.	(?)	36	Erysipelas.	3 weeks.	75	† Carc. ventriculi.	98	"	183	
43	Scar.	32 months.	37	Erysipelas.	Few days.			114	"	184	
44	Scar and axilla.	Immediately.	111	Metastases.	1 month.	77	† Carc. ventriculi.	121	† 14 "	185	
45	Scar, axilla, and neck.	12 months.						126	"		
46	Scar.	32 "				99	† Carc. ventriculi.	135	† 1 year.		
47	Axilla.	3 "						136	9½ years.		
48	Scar and axilla.	Immediately.				107	† Carc. ventriculi.	137	9 yrs. 9 mos.		
49	Axilla and skin.	(?)				102	"	138	6 " 9 "		
50	Recurrence.	(?)				113	† Cachexia.	139	6 " 7½ "		
51	Scar and axilla.	4 months.				120	† Carc. ventriculi.	140	5 " 9¾ "		
52	Scar and axilla.	6 weeks.						141	5 " 7 "		
53	Scar.	3½ months.						142	5 " 6 "		
55	Supraclav. glands and skin.	Few months.				123	† Carc. pleurae.	143	5 " 5½ "		
56	Scar.	(?)				128	† Carc. liver, and possibly stomach.	144	5 " 15 days.		
57	Axilla and supraclav.	8 months.						145	3 " 10 mos.		
58	Scar and axilla.	6 "						146	3 " 10 "		
60	Recurrence.	"						147	3 " 8 "		
61	Scar and axilla.	"						148	3 " 10 "		
62	Recurrence.	"						150	3 " 10 "		
63	Scar.	16 "						151	3 " 30 (?) "		
64	Scar.	Immediately.						152	3 " 2 "		
65	Skin.	10 months.						153	3 " 4 "		
66	Scar.	(?)						154	3 " 3 "		
67	Recurrence.	(?)						155	2 " 5 "		
69	Scar.	4 weeks.						156	2 " 1 month.		
70	Scar.	(?)						157	2 " 1 "		
71	Inoperab. canc. <i>en cuirasse</i> .	3 years.						158	1 year 8 months.		

¹ Dr. Franz Fink, ein Beitrag zu den Erfahrungen über die operative Behandlung des Mammacarcinoms, 1878-86, Prager Zeitschrift für Heilkunde, 1888.

TABLE VI.—CLINIC OF GUSSENBAUER. (Continued.)

LOCAL RECURRENCE, 64 PER CENT.			DIED SOON AFTER THE OPERATION.		NO NOTE AS TO LOCAL RECURRENCE.		NO LOCAL RECURRENCE.		RESULT UNKNOWN.
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.	Time Post-Operat.	No.	
72	Scar.	2 years.				159	1 year 7 months.		
73	Scar.	1½ years.				160	1 " 6 "		
74	Scar.	5 months.				161	1 " 6 "		
76	Scar.	Few weeks.				162	1 year.		
78	" Recurrence."	?				166	4 yrs. 7 mos.		
79	Scar and axilla.	4 years.				167	7 " 4½ mos.		
80	Scar and axilla.	Immediately.				168	3 " 11 "		
81	Scar.	Very soon.				169	3 " 4½ "		
82	Scar.	4 months.				170	1 yr. 6 mos.		
83	Scar.	10 months.				171	2 yrs. 4 mos.		
84	Scar.	Immediately.				172	1 yr. 1½ mos.		
85	Scar.	11 months.				173	1 yr. 1½ mos.		
86	Scar.	3 years.				174	2½ years.		
87	Middle of scar.	22 months.				175	3 "		
88	Scar.	3 months.				178	9 "		
89	Scar.	4 weeks.							
90	Scar.	6 months.							
91	Scar, axilla, and supraclav.	8 months.							
93	Scar.	Immediately.							
95	Scar.	Very soon.							
97	" Recurrence."	Very soon.							
100	Scar and axilla.	Very soon.							
101	Scar.	Very soon.							
102	Scar and axilla.	3½ months.							
103	Scar.	3 "							
104	Scar.	12 "							
105	Scar.	3 "							
106	" Recurrence."	11 "							
108	Scar.	Very soon.							
109	Scar.	Immediately.							
110	Scar.	Very soon.							
115	Scar and axilla.	15 months.							
116	Scar.	3 weeks.							

TABLE VI.—CLINIC OF GUSSENBAUER. (Concluded.)

LOCAL RECURRENCE, 64 PER CENT.		DIED SOON AFTER THE OPERATION.			NO NOTE AS TO LOCAL RECURRENCE.		NO LOCAL RECURRENCE.		RESULT UNKNOWN.
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.	No.	Time Post-Operat.	
117	Scar.	Very soon.							
118	Scar.	" "							
119	Scar and axilla.	" "							
122	Axilla.	" "							
124	Scar and axilla.	4 weeks.							
125	Scar.								
127	Scar and axilla.	6 weeks.							
129	Scar.	12 months.							
130	Scar and axilla.	Very soon.							
131	Scar.	" "							
132	Scar and axilla.	" "							
133	Scar and axilla.	(?)							
134	Scar, axilla, & supraclav. gl.	(?)							
149	Scar.	14 months.							
163	Scar.	4½ "							
164	Scar.	8 "							
165	Supraclav.								
177	Scar and axilla.	9 "							
182	Scar.	Immediately.							

TABLE VII.—CLINIC OF KÖNIG,¹ 1875-85. 152 Cases.

LOCAL RECURRENCE, 58-62 PER CENT.			DIED SOON AFTER THE OPERATION.			NO LOCAL RECURRENCE.			No.	RESULT UNKNOWN.
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.	Time Post-Operat.			
1	Skin.	4 weeks.	5	Erysipelas.	10 days.	3	11 years.	21	Carc. vertebrae, died less than one year.	
2	Skin and axilla.	3 months.	10	"Abdominal disease."	51 "	4	1 1/2 "	28	General carcinosis.	
7	Axilla.	1 1/2 years.	13	Apoplexy.	50 "	6	1 1/4 "	35	Result unknown.	
11	Axilla and skin.	After 3 years.	15	Erysipelas.	12 "	8	13 months.	58	(?)	
18	Axilla.	3 years.	16	Septicæmia.	8 "	9	13 "	64	† 1 year.	
22	Scar.	2 "	19	(?)	Few days.	12	4 years.	95	† 18 months. (?)	
24	Scar, "cuirasse."	2 months.	20	Hæmorrhagic lung infarction.	2 days.	14	6 "	121	(?)	
25	Scar.	1 year.	29	Septicæmia.	9 "	17	9 "	122	(?)	
27	"Cuirasse."	3 months.	33	Pneumonia.	16 "	23	3 "	130	† 1 year.	
30	Scar.	3 or 4 months. (?)	61	Erysipelas and pneumonia.	8 "	26	6 "	131	† 6 months. Carc. liver.	
36	Scar.	6 months or less.	69	Drowned.	2 months.	31	6 "	134	(?)	
37	Scar.	8 months.	74	Broncho-pneumonia.	11 days.	40	7 "	138	(?)	
38	Axilla.	16 "	76	Pneumonia.	9 "	41	6 "	139	† 1 year. Carc. liver.	
39	Axilla.	1 month.	98	Erysipelas.	6 "	45	3 "			
42	(?) Recurrence.	8 months.	91	Pneumonia, cancer of lungs and bronchi.	19 "	46	6 "			
43	Scar and above clav.	3 years.				49	6 "			
47	Axilla.	1 year.				54	6 "			
48	"Recurrence."	6 months.				62	† 17 months.			
50	Axilla and scar.	11 "				80	4 years.			
51	Scar.	Never healed.				83	4 "			
52	"Local recurrence."	2 or 3 months.				84	3 "			
53	Axilla.	5 months.				86	4 "			
55	Scar and axilla.	Immediately.				87	4 "			
56	Scar.	2 months.				90	3 "			
57	Above scar.	Immediately.				97	1 year.			
58	Axilla and above clavicle.	† 2 years or less.				105	2 1/4 year.			
60	Scar. (?)	Immediately.				108	† 1 1/2 years. Cancer of kidney.			
63	"Recurrence."	† 1 year.				110	2 years.			
65	Scar.	† 1 "				113	3 "			
66	Scar.	4 months.								
67	"Recurrence."	6 "								

¹ Hildebrand. Beitrag zur Statistik des Mammacarcinoms der Frau, Deutsche Zeitschrift für Chirurgie, Bd. xxv, 1887.

TABLE VII.—CLINIC OF KÖNIG. (Continued.)

LOCAL RECURRENCE, 58-62 PER CENT.			DIED SOON AFTER THE OPERATION.			NO LOCAL RECURRENCE.		No.	RESULT UNKNOWN.
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.	Time Post-Operat.		
68	"Recurrence," sternum					114	2 years.		
70	pect. muscle.	(?) years.				116	+ Less than 1 year.		
71	Scar never healed.	+ 3½ months.					Suicide.		
72	Scar and axilla.	13 months.				117	2 years.		
73	Scar and skin. (?)	+ 8 "				118	2 "		
73	Scar.	Immediately.				1	2 "		
75	Skin and axilla.					123	6 months.		
77	Scar.	1 year.				124	+ 1 year.		
78	"Recurrence,"	+ 6 months.				128	1¼ years.		
81	Scar and axilla.	6 "				129	1 year.		
81	Scar (?) and axilla.	14 "				135	+ 2 years.		
82	"Recurrence."	6 "				137	3 years.		
85	Scar and axilla.	6 "				145	3 "		
89	Axilla.	10 "				146	3 "		
92	Scar.	6 "				150	2 "		
93	Skin.	6 "				151	6 months.		
94	Scar.	8 "				152	6 "		
94	Scar.	6 "				34	+ 1 year.		
96	Scar.	10 "				32	+ 6 months.		
96	Scar and skin.	2 years.				28	+ 6 "		
98	Scar and axilla.	2 years 7 months.				79	+ 6 "		
99	Scar.	+ 11 months.				102	+ 6 "		
100	Scar.	+ 13 "				111	+ 5 "		
101	"Recurrence."	2 "							
103	Scar.	Less than 3 months.							
104	Scar.	Less than 1 year.							
106	Scar.	+ 6 months.							
107	Scar.	6 "							
	Second and third operations.	+ 1 year.							
109	Axilla.	2 months.							
112	Axilla.	6 "							
115	Scar.	5 "							
120	Skin below and near scar.	9 "							

TABLE VII.—CLINIC OF KÖNIG. (Concluded.)

LOCAL RECURRENCE, 58-62 PER CENT.		DIED SOON AFTER THE OPERATION.			NO LOCAL RECURRENCE.		No.	RESULT UNKNOWN.
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.		
125	Recurrence scar and above clavicle.	6 months.						
126	Scar.	Few weeks.						
127	Pect. major near axilla.	5 months.						
132	Scar. (?)	1 year.						
133	Operated four times, still alive.	4 years.						
136	Scar and axilla.	9 months.						
140	Scar (?) and axilla.	† 2 years with recurrence.						
141	Scar.	1 year. (?)						
142	Scar.	6 months.						
143	Scar.							
144	Scar.	Immediately. (?)						
147	Scar.	1 year.						
148	Second operation, alive three years after.							
149	Scar (?) and skin.	3 months.						
	Scar.	1 year.						

TABLE VIII.—CLINIC OF KÜSTER.¹ From May, 1871, to December, 1885. 228 Cases.

LOCAL RECURRENCE, 59 PER CENT.			DIED SOON AFTER THE OPERATION.			NO LOCAL RECURRENCE.			NO NOTE AS TO LOCAL RECURRENCE.			No.	RESULT UNKNOWN.
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.	Time Post-Operat.	No.	No.	Cause of Death.	Time Post-Operat.		
1	(1) Scar.	8 months.	2	Erysipelas.	13 days.	18	15 years.	37	+	Carc. of pleura and stomach.	2 yrs. 5 mos.	57	
2	(2) Axilla scar.	14 "	10	Erysipelas.	18 "	34	8 "	39	+	Carc. of pleura.	3 months.	65	
3	Axilla.	Soon after healing.	11	Erysipelas.	9 "	40	3 "	41	+	Erysipelas.	5 "	70	
4	Scar.	Immediately.	25	Pyæmia.	12 "	42	3 "	67	+	" "Recurrence" (pleura?)	2 3/4 years.	78	
5	(1) Scar.	8 months.	28	Erysipelas.	19 "	43	4 "	69	+	" "Recurrence" (carc. vertebral column).	2 1/4 "	83	
6	(2) Skin of neck.	11 "	31	Profuse diarrhoea.	5 "	50	4 "	72	+	" "Recurrence" (vertebral column & liver).	(?) 13 mos.	106	
7	(3) Breast and axilla.	13 "	35	Erysipelas.	10 "	51	7 "	84	+	" "Recurrence" (lung cancer).	10 months.	107	
8	(4) Near scar, axilla.	Very soon.	47	Collapse.	2 "	55	7 "	96	+	" "Recurrence" (Probably metastases).	1 year.	131	Probably recurrence.
9	" "Recurrence."	Immediately.	53	Pleuritis carcinomatosa.	3 "	56	6 "	95	+	" "Recurrence" (Probably metastases).	1 year.	165	
10	" "Local Recurrence."	Very soon.	59	Septicæmia.	6 "	80	4 months.	102	+	" "Recurrence" (Probably metastases).	1 year.	168	
11	" "Local Recurrence."	Immediately.	91	Collapse.	3 "	98	5 years.	116	+	" "Recurrence" (Probably metastases).	1 year.	169	
12	" "Local Recurrence."	Very soon.	100	Erysipelas.	16 "	101	4 "	122	+	" "Recurrence" (Probably metastases).	1 year.	172	
13	pectorialis major, etc.	(?)	104	Erysipelas.	16 "	17	10 "	144	+	" "Recurrence" (Probably metastases).	1 year.	177	
14	Under scar.	8 months.	108	Attack of dyspnoea.	2 "	109	3 "	146	+	" "Recurrence" (Probably metastases).	1 year.	179	
15	" "Local Recurrence."	2 years.	122	Pleuritis.	44 "	112	3 "	150	+	" "Recurrence" (Probably metastases).	1 year.	180	
16	" "Local Recurrence."	4 months.	125	Erysipelas.	10 "	118	3 "	151	+	" "Recurrence" (Probably metastases).	1 year.		
17	" "Local Recurrence."	Immediately.	128	Edema of lungs.	11 "	119	3 "	154	+	" "Recurrence" (Probably metastases).	1 year.		
18	(1) Scar.	3 months.	139	Sepsis.	6 "	126	2 1/2 "	156	+	" "Recurrence" (Probably metastases).	1 year.		
19	(2) Axilla.	7 "	140	Sepsis.	Immediately.	183	3 "	157	+	" "Recurrence" (Probably metastases).	1 year.		
20	" "Local Recurrence."	Very soon.	141	Sepsis.	10 days.	184	2 "	157	+	" "Recurrence" (Probably metastases).	1 year.		
21	" "Local Recurrence."	4 months.	142	Sepsis.	7 days.	185	2 "	157	+	" "Recurrence" (Probably metastases).	1 year.		
22	" "Local Recurrence."	1 year.	143	Pneumonia and nephritis.	Very soon.	186	2 "	157	+	" "Recurrence" (Probably metastases).	1 year.		
23	" "Local Recurrence."	4 1/4 years.	127	Carc. liver.	6 weeks after discharge.	187	2 1/2 "	157	+	" "Recurrence" (Probably metastases).	1 year.		
24	Axilla and near scar.	Very soon.	93			188	2 1/2 "	157	+	" "Recurrence" (Probably metastases).	1 year.		
25	" "Local Recurrence."	Very soon.				189	2 1/2 "	157	+	" "Recurrence" (Probably metastases).	1 year.		
26	" "Local Recurrence."	Very soon.				190	2 "	157	+	" "Recurrence" (Probably metastases).	1 year.		
27	Infraclav. glands.	5 times.				191	9 months.	157	+	" "Recurrence" (Probably metastases).	1 year.		
28	" "Local Recurrence."	5 times.						157	+	" "Recurrence" (Probably metastases).	1 year.		

¹ (1) Zur Statistik der Mammacarcinome und deren Heilung, V. Schmidt, Deutsche Zeitschrift für Chirurgie, Bd. XXVI, 1887. (2) Fünf Jahre im Augustahospital, Berlin, 1887. (3) Ein chirurgisches Triennium, Berlin, 1882. (4) Zur Behandlung des Brustkrebses, Verhandlung der deutschen Gesellschaft für Chirurgie, 1883.

TABLE VIII.—CLINIC OF KÜSTER. (Continued.)

LOCAL RECURRENCE, 59 PER CENT.			DIED SOON AFTER THE OPERATION.			NO LOCAL RECURRENCE.			NO NOTE AS TO LOCAL RECURRENCE.			No.	RESULT UNKNOWN.
No.	Situation.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.	Time Post-Operat.		No.	Cause of Death.	Time Post-Operat.		
30	"Local Recurrence."	5 months.				192	1 yr. 10 mos.		161				
32	"Local Recurrence."	10 "				193	" "						
33	"Local Recurrence."	Soon.				194	" "		106	† Carc. of pelvis,			
36	"Recurrence."	3 yrs. 10 mos.				195	2 yrs. 3 mos.		162	† Carc. of pleura and lungs.			
45	(1) Scar.	1 yr.				196	1 ½ yrs.						
	(2) Scar.	2 years.				197	1 yr. 7 mos.						
	(3) Supraclav. glands and scar.	4 "				198	1 yr. 8 mos.						
48	"Recurrence."	† 14 months.				199	9 months.						
49	Skin and axilla.	2 months.				200	1 yr. 7 mos.						
52	Axilla.	1 ½ years.				201	1 yr. 7 mos.						
54	"Recurrence."	1 yr. 10 mos.				202	2 yrs. 1 mo.						
60	"Recurrence."	† 14 months.				203	1 yr. 4 mos.						
61	"Recurrence."	† 3 "				204	1 yr. 4 mos.						
63	"Local recurrence."	† 1 yr. † 2 yrs.				206	1 year.						
64	(1) Scar.	8 months.				207	1 year.						
	(2) Scar.	11 "				208	11 months.						
66	"Local recurrence."	† 6 ½ months.				209	5 years.						
68	Scar, axilla, and supra-clav. glands.	Immediately.				210	1 yr. 4 mos.						
	"Local recurrence."	† 3 years.				211	10 months.						
71	Scar.	1 year.				212	13 "						
73	"Local recurrence."	2 years.				213	7 "						
74	Cancer <i>en cuirasse</i> .	† 1 yr. 4 mos.				214	5 "						
75	"Local recurrence."	3 months.				216	5 "						
76	Near scar.	Very soon.				217	5 "						
79	Near scar.	1 yr.				218	4 "						
81	Near scar.	1 yr. 7 mos.				219	8 "						
82	Scar.	5 months.				220	8 "						
85	(1) Local recurrence. (2) Scar and wall of thorax.	18 days.				221	7 "						
	Supraclav. glands.	3 months.				222	7 "						
86						223	7 "						
87						224	7 "						
						225	7 "						
						226	5 "						

TABLE IX.—CLINIC OF LÜCKE,¹ 1881-90. 110 Cases.

LOCAL RECURRENCE, 66 PER CENT.		
No.	Situation.	Time Post-Operat.
5	"Local recurrence."	2 months. Patient lives.
11	Pect. major.	6 months. Patient lives.
13	Scar.	1 year.
	(2) Recurrence.	2 months. Patient lives.
24	"Local recurrence."	Died 3 months after operation.
26	Scar, vertebræ, leg.	2 months.
27	"Local recurrence."	months. (?)
28	"Local recurrence."	Very soon after operation.
31	Scar.	6 months.
	(2) "Local recurrence."	
32	Scar.	Few months.
34	Scar.	17 months.
35	"Local recurrence."	Died 4 years after operation. •
36	"Recurrence."	1½ years.
39	"Local recurrence."	Very soon.
	(2) "Local recurrence."	Very soon.
40	Scar.	1 month.
42	Skin. •	6 days before dismissed.
44	"Local recurrence."	7 months.
47	Axilla.	Few months.
49	"Local recurrence."	Immediately.
50	Skin.	Very soon.
51	"Local recurrence."	Died 13 months.
53	Axilla.	2 months.
	Second recurrence.	† 1 year.
54	Scar.	1 year.
55	"Local recurrence."	1 year.
56	"Local recurrence."	† 3½ years.
58	"Local recurrence."	† 7 months.
59	Ulceration in scar.	† 2 years after operation.
61	Scar.	1 month.
62	Scar.	24 days.
63	"Local recurrence."	6 months and 9 months.
64	"Local recurrence."	months. (?)
65	"Local recurrence."	Very soon.
66	"Local recurrence."	Very soon.
67	(1) "Local recurrence."	4 months.
	(2) "Local recurrence."	Very soon.
68	"Local recurrence."	1 year.
70	"Local recurrence."	† 3¼ years.
71	"Local recurrence."	† 9 months.
73	"Local recurrence," axilla, sup. and infraclav.	39 days.
74	"Local recurrence."	† 7 months.
75	"Local recurrence."	6 months.
	(3) Local recurrences.	†
76	"Local recurrence."	† 11 months.
77	"Local recurrence."	† 13 months.
78	"Local recurrence."	3 months or less.
	(3) Local recurrences.	
79	"Local recurrence."	† 9 months.
80	"Local recurrence."	† 7 months.
81	"Local recurrence."	† 13 months.
82	Scar.	4 months.
84	Axilla.	6 weeks.
87	Axilla.	22 days.
88	"Local recurrence."	† 10 months.

¹ Dietrich. Beitrag zur Statistik des Mammacarcinoms, Deutsche Zeitschrift für Chirurgie, Bd. xxxiv, 1892.

TABLE IX.—LÜCKE. (Concluded.)

DIED SOON AFTER THE OPERATION.			NO NOTE AS TO LOCAL RECURRENCE.			NO LOCAL RECURRENCE.	
No.	Cause of Death.	Time Post-Operat.	No.	Cause of Death.	Time Post-Operat.	No.	Time Post-Operat.
25	Pneumonia.	16 days after operation.	41		† 7 months after operation.	1	10½ years.
29	Erysipelas.	14 days after operation.	69	Phthisis.	1¾ years.	2	7¾ "
30	Erysipelas.	16 days after operation.	72	Metastases.	† 15 months.	3	7 "
33	Erysipelas.	16 days after operation.	83	(?)	† 1½ years.	4	6¾ "
37	Brain metastases.	39 days after operation.	85	Old age.	† (?)	6	4¾ "
46	Erysipelas.	14 days.	89	Liver metastases.	† Less than 6 months.	7	4¾ "
48	Lung embolism.	15 days.				8	4¾ "
60	(?)	Soon after operation.				9	4¼ "
86	Œdema of lungs, cancer of lungs, liver, spleen, omentum.	10 days.				10	3¼ "
						12	2 yrs. 10 mos.
						14	3¼ years.
						15	1¾ "
						16	1½ "
						17	13 months.
						18	1¼ years.
						19	1 year.
						20	1 "
						21	1 "
						22	1 "
						23	10 months.
						38	† 4¾ years.
						43	† 1 year.
						45	† 2 yrs. 4 mos.
						52	† 4 years.
						57	† 4 "

TABLE X.—CLINIC OF VOLKMANN.¹ 1874-78. 131 Cases.

LOCAL RECURRENCE, 59 PER CENT.		
No.	Situation.	Time Post-Operat.
1	Pectoralis major.	Two years.
2	Scar.	Less than two years.
3	Scar.	Less than two years.
4	Scar.	Less than six months.
7	Scar.	Three months.
9	Scar and axilla.	Less than six months.
10	Scar.	Eleven months.
12	Near scar.	Two months.
13	Scar and axilla.	One year.
15	"Local recurrence."	Before healing.
16	Above scar.	Two months.
17	Near scar.	Ten "
18	Close to scar.	Eight "
19	"Local recurrence."	Five "
21	Above scar.	Less than two years.
23	"Local recurrence."	Very soon.
25	"Recurrence," under pectoralis major.	One month.
27	Scar.	Very soon.
29	"Recurrence" near scar.	Four months.
32	Scar.	Very soon.
34	Scar.	Five months.
36	Axilla.	Five "
42	Scar.	Five "
43	"Local recurrence."	Very soon.
47	Pectoralis major.	One year.
48	"Local recurrence."	Eight months.
49	"Local recurrence."	One year ten months.
51	"Local recurrence."	One and a half years.
52	"Local recurrence."	Several times.
57	Scar.	Ten weeks.
59	"Local recurrence."	† One and a half years.
61	"Local recurrence."	One year.
65	Near scar.	Few weeks.
67	"Local recurrence."	Two years.
73	"Local recurrence."	Very soon after discharge.
74	Scar.	One month.
79	Ribs and sternum.	
80	Near scar. (?)	One month.
83	Axilla. (?)	(?)
86	(?)	About one year.
87	"Recurrence."	† One year.
89	Scar and axilla.	† Less than four months.
92	Skin and axilla.	Less than one year.
93	Sternum.	One month.
94	Near scar and in axilla.	Four months.
95	"Recurrence" about scar.	Ten months.
98	Near scar.	Twenty days.
100	Scar.	Two and a half years.
102	"Local recurrence," skin.	One and a half years.
104	"Local recurrence" above scar.	† Six months.
107	"Local recurrence."	Half year.
108	Scar and axilla.	Three months.
111	"Local recurrence," scar.	† Six months.
113	During healing above wound.	
116	"Recurrence," axilla.	† One and a half years.
121	"Recurrence," axilla and skin.	Two months.
123	Scar.	Eleven months.
124	"Local recurrence."	† One year ten months.
125	"Local recurrence."	One year seven months.
129	Scar.	Two months.
130	Scar.	One year.
131	Scar.	Six months.

¹ Sprengel. Archiv für klinische Chirurgie, Bd. XXVII, 1882.

TABLE

Operator.	Time.	No. of Cases.	Local Recurrence.	100	98	96	94	92	90	88	86	84	82	80	78	76	74	72	70	68	66	64
Bergmann . .	1882-87	114	51-60 per cent.																			
Billroth . . .	1867-76	170	82 per cent.																			
Czerny . . .	1877-86	102	62 per cent.																			
Fischer . . .	1871-78	147	75 per cent.																			
Gussenbauer .	1878-86	151	64 per cent.																			
König . . .	1875-85	152	58-62 per cent.																			
Küster . . .	1871-85	228	59.6 per cent.																			
Lücke . . .	1881-90	110	66 per cent.																			
Volkman . .	1874-78	131	60 per cent.																			
Halsted . . .	1889-94	50	6 per cent.																			



Regionary recurrence.

TABLE XI.

[illegible]

40	38	36	34	32	30	28	26	24	22	20	18	16	14	12	10	8	6	4	2
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

[Redacted text line]

EXPERIMENTAL RESEARCHES UPON THE PRO-
DUCTS OF THE TUBERCLE BACILLUS.

By ANGELO MAFFUCCI, M.D.,

OF PISA,

PROFESSOR OF PATHOLOGICAL ANATOMY IN THE UNIVERSITY OF PISA
ITALY.

THE most cursory examination of a tuberculous individual shows two facts: localized inflammatory processes and general wasting.

Hitherto all inquirers have believed that the inflammatory and necrobiotic products came from the presence of the specific bacillus, and I have been convinced by experiments with the fowl-embryo (*Riforma medica*, 1889) that the general wasting is caused by the protoplasm of the living bacillus which has been destroyed by the embryos, or by the same protoplasm of the bacillus dead before inoculation into the embryos which destroyed it, because the embryos which have destroyed the living or dead bacillus were born marasmic and died.

In 1890 I got another proof: observing that the sea-hogs inoculated with dead tubercle bacilli into the cellular subcutaneous tissue died marasmic, with manifestations of abscesses at the point of inoculation, with hyperæmia in the lungs under the form of catarrhal pneumonitis, with endobronchitis proliferans and with hæmorrhagia, with nephritis parenchymalis and interstitialis, with atrophy of the liver and degeneration of the muscular fibre of the heart, with atrophy of the spleen and pigmentation. The death of these animals happened from a few days to a month after the inoculation. By these facts I could interpret the wasting and also the other inflammatory and degenerative lesions, which I found in the tissues of the tuberculous without finding tuberculosis in these organs, and, therefore, I concluded that in the pro

toplasm of the dead bacillus exists a toxic substance capable of producing inflammatory and necrobiotic processes, which circulates in the blood from the inoculation-point or from a tubercular focus, destroying the red corpuscles of the blood and producing in the parenchyma of the organs atrophy, necrosis, and inflammation. Having proved these facts, I wished to know if this toxic substance, generated by the destruction of the protoplasts of the tubercle bacillus, might be influenced by the age of the bacillus, by the different grades of the temperature, by desiccation, by the sun, by the juices of the stomach, and by the different points where the inoculation, of the dead bacilli have been made.

Bacillus of Human Tuberculosis; Age of the Cultures.—

The cultures of six months, of one year, of eighteen months, of two or three years, kept in humidity, do not lose the toxic power, when inoculated, in little or large doses, in the cellular subcutaneous tissues in the belly cavity and trachea of sea-hogs.

Action of the Temperature.—The recent cultures and the oldest ones, of one or two years, subjected for one or two hours to a heat of 65° , 70° , 80° , 90° , 100° , 110° C. do not lose their toxic power.

The same young cultures, kept in the oven at 45° for twenty-five days, lose their power of growth and become toxic, and are similar to old or young cultures kept under a high temperature.

Action of Desiccation.—Placing young and old tubercular cultures under a bell with air completely dry, and removing the culture medium and placing the cultures on watch-glasses for three until fourteen months, and inoculating them into sea-hogs, they maintain their toxic power.

Action of the Sunlight.—The old and young cultures, kept from fifteen days until a month on the culture medium, exposed to the sunlight with a temperature of 32° , did not lose their toxic power when inoculated into sea-hogs.

Action of the Sunlight and of the High Temperatures.—Other cultures placed until forty-five days under the action of

the sunlight, and then exposed to a temperature of 100° for two hours, did not lose the toxic power when inoculated into the sea-hogs.

Action of the Digestive Juices.—Feeding the sea-hogs upon boiled tuberculous organs or sterilized cultures, they died by marasmus, as if they had been inoculated with a sterilized culture in the subcutaneous cellular tissues. Then a tubercular culture has been introduced into the stomach of a dog and then inoculated into the cellular tissue of the sea-hogs, which died of marasmus but not with tuberculosis. This fact proves that the stomach juice has no influence over the toxic product of the tubercle bacillus.

Is the toxic product of the tubercle bacillus generated by the destruction of the bacillus? A toxic product of a bacterium can be a product of secretion or of disintegration of the culture medium, on which the bacillus lives, or a product of its dead protoplasm. I have been convinced that probably the toxic product of the tubercle bacillus proceeds from the protoplasm of the dead bacillus.

Taking the cultures on liquid strata, the bacillus vegetates on the surface of the liquid, which was the blood serum of the cow, and was filtered after the method of Chamberland, and reduced under a pneumatic bell to a sixth part of its volume, and then inoculated into the sea-hogs (six centimetres equal to thirty centimetres of the liquid serum). The sea-hogs did not die by marasmus, but those inoculated with a piece of the bacillar pellicle (sterilized) died by marasmus.

These cultures diluted in distilled water with 0.75 per cent. of chloride of sodium, under the temperature of 39° for five days, and filtered and reduced in volume under a pneumatic bell, and inoculated in large doses into sea-hogs, these died by marasmus.

These experiments prove that it is not a product of disintegration of the culture medium, nor a product of secretion, and must be always an integral part of the bacillus.

Fowl Tuberculosis.—It was necessary to know if the toxic

products of the bacillus of the fowl tuberculosis may be different from that of the tuberculosis of the mammalia.¹

Action of Heat.—The cultures of the fowl tuberculosis in contrast with those of the mammal tuberculosis can develop at 25° or 45°. Therefore I made experiments with the cultures of fowl tuberculosis, grown at different temperatures, keeping these cultures for some days in the oven, or for a longer time. All the sea-hogs inoculated with those two varieties of cultures became marasmic. Keeping the old and young cultures at 100°, the inoculated sea-hogs died marasmic.

Age of the Cultures.—A characteristic of the bacillus of the fowl tuberculosis is the fact that it is destroyed in the culture media after a certain time.

The bacillus of the fowl tuberculosis grows well in liquid media without forming the pellicle characteristic of the bacillus of human tuberculosis. Therefore these growths contain more destroyed bacilli, the greater may be their age, and all the inoculated sea-hogs die by marasmus, but the old cultures make the sea-hogs die quicker,—*e.g.*, the cultures of three years make them die after a few days. This proves that the age has no importance for the diminution of the toxic power of the cultures, but shows that this power increases by the destruction of the bacillus, and therefore the oldest cultures are the most toxic.

Action of the Digestive Juices.—The sea-hogs, which eat cultures of fowl tuberculosis, die after thirty or forty days by marasmus.

Influence of the Sunlight.—Cultures of different age, kept until forty-five days under the action of the sunlight with a temperature of 32°, and inoculated into sea-hogs, make them die marasmic.

Action of the Sunlight and High Temperature.—The same cultures of different age, kept for forty-five days under sunlight, and with a temperature of 100° for two hours, inoculated into sea-hogs, make them die by marasmus.

Remarks.—My experiments and those made by Prudden,

¹ *Riforma medica*, 1889-90.

Strauss, Gamaleia, upon the dead bacillus of tuberculosis, may prove that the inflammatory forms with the anatomical characters of tubercle, may be produced by the same dead bacillus. Therefore these toxic products of the dead bacillus have a great importance, and merit all the interest of inquirers to get a possible therapic influence upon the tubercular process.

With these researches I have proved my first idea, that *the dead tubercle bacillus contains a toxic product which has a great resistance against very potent physical agents.*

THE OPERATIVE TREATMENT OF GALL-STONES IMPACTED IN THE CYSTIC OR COMMON BILE-DUCTS.

By J. F. BINNIE, C.M.,

OF KANSAS CITY,

PROFESSOR OF SURGICAL PATHOLOGY AND CLINICAL SURGERY,
KANSAS CITY MEDICAL COLLEGE.

IT is not my purpose to attempt any systematic or complete description of the many methods employed by surgeons to remove impacted gall-stones from the lower biliary passages, but rather to draw attention to some of the chief dangers and difficulties met with, and to make some suggestions as to overcoming them.

Some of the Difficulties and Dangers.—(1) The difficulty of finding the gall-bladder may be great, owing to its diminution in size and to its lying hidden in a mass of adhesions resulting from old inflammation.

(2) The gall-bladder having been exposed, it may be found so shrunken and its seat so deep that it becomes an impossibility to bring it to the parietes, and extremely difficult to carry out the operative manipulations indicated.

(3) The same remarks apply, in an exaggerated degree, to the case of stones impacted in the cystic or common bile-ducts.

(4) Other things being equal, the dangers of operation increase *pari passu* with the time consumed.

In cases of stone in the cystic or common bile-ducts, where it is possible to suture the gall-bladder to the parietes, it is my practice to endeavor by the usual means to deliver these obstructions through the gall-bladder. If, however, this proves difficult and consumes much time, the gall-bladder is stitched to the

abdominal walls and the extraction of the calculi left to a second sitting.

Owing to many causes,—*e.g.*, shrunken gall-bladder, overlapping liver, extensive adhesions, etc.,—it is often impossible to carry out the procedures spoken of above, and it is with the methods of treating these extremely difficult cases that this paper deals.¹

(a) *Methods of Removing the Stones from the Duct.*—(1) Removal of the stone through a wound in the gall-bladder.

This method is the best where possible, but owing to the firmness with which the duct wall may grasp the concretions, or to the narrowness of that portion of the duct lying between the bladder and the stones, it is frequently impracticable.

(2) The gall-bladder having been opened, the stone may be broken *in situ* either by padded forceps acting through the duct-wall or by needling. The fragments are removed through the wound in the gall-bladder. This method has been successfully employed, especially by Mr. Tait. Kehr criticises this operation on the ground that the complete removal of the detritus is often impossible.

(3) Stones situated low down in the common duct may be pushed into the intestine by a probe introduced through the incised gall-bladder. Abbe has done this successfully.

(4) Removal of stones through a wound in the duct itself.

When it is impossible or extremely difficult to remove stones from the ducts by the usual means through the gall-bladder, it is best to incise the duct directly over the stones and so remove them rapidly.

(b) *Methods of Treating the Wounded Gall-Bladder or Duct.*—(1) *Suture.*—As a rule, when it can be readily carried out, the best method of treating wounds of the gall-bladder and ducts is by means of suture. In many cases, unfortunately, the wounds to be treated are so deeply seated and in such a confined space

¹ The subject of forming an anastomosis between the intestine and the gall-bladder or a hugely-distended bile-duct is, of course, excluded from this paper, since such operations are impossible except when the gall-bladder is of fair or the duct of huge size.

that this method consumes very much valuable time and the closure is imperfect. The importance placed on drainage by Mr. Thornton shows that even such a skilled wielder of the needle as he mistrusts his own suturing under such circumstances.

Another difficulty which occasionally confronts the surgeon is to distinguish, at the bottom of a deep and narrow pit, the wounded duct from oozing adhesions recently divided.

(2) *Cholecystectomy*.—Excision of the gall-bladder, when it is contracted or its walls are so friable that stitches will not hold, has been strongly recommended by Langenbuch and others. When the stone for which we are operating is situated low down in the cystic or in the common duct, I fail to see any advantage to be obtained from the removal of the gall-bladder commensurate with the disadvantages incident to loss of time.

A danger common to the suture method and to cholecystectomy is that it is manifestly impossible, in all cases, to know positively that all obstruction to the flow of bile into the intestine has been removed. When a temporary fistula has been provided, the dangers from this source are minimized.

Riedel and Winiwarter both seem to realize this, since, while recommending cholecystectomy, they merely temporarily ligate the cystic duct, and, using the omentum, form a funnel of peritoneum leading from the point of ligation to the parietes.

(3) Direct drainage from the open gall-bladder or duct *plus* drainage of the general peritoneal cavity.

Where it has been found impossible to close the wounds in the gall-bladder or ducts, Thornton and others have placed a rubber or other drain beside these wounded organs, and have trusted to this and a drainage-tube placed in Douglas's pouch to remove any biliary material which may have been thrown out into the general peritoneal cavity.

While it must be admitted that pure bile, even in considerable quantity, seems to have but little power to excite peritonitis, it must not be forgotten that in the cases under consideration the bile is practically always mixed with the products of inflammation, and is specially prone to be infected with the *bacillus coli communis*. This being so, drainage by the method just described cannot be considered other than hazardous.

(4) Murphy, of Chicago, has introduced a modification of his well-known button, in which the female half of the instrument is elongated as a drainage-tube, in order to reach from the deep-seated gall-bladder to the parietes. His manner of operating is as follows: "The gall-bladder is located, a sufficient surface of its wall exposed, the contents aspirated, the purse-string suture inserted, the gall-bladder incised, male half of button inserted, purse-string tied and cut short, the tubular portion of button is then pressed into position, the tube is then drawn out as far as the gall-bladder will permit, and held there with a pin passed through the openings in its side. During the time the pressure atrophy in the portion of the gall-bladder clasped between the button is taking place a cicatricial wall is being formed about the tube, which acts as the wall of a sinus after its production, and insures continued protection of the peritoneal cavity."

This operation is extremely ingenious, but in many cases, especially those in which its use would otherwise help us most, it is inapplicable.

If the gall-bladder is deeply seated, and its walls friable, the introduction of the purse-string suture would be difficult or impossible. If the gall-bladder is very small and shrunken, it cannot contain the male half of the button. If the opening is in the duct, the button operation is generally out of the question. For these reasons the Murphy operation must be of very limited utility.

It seems to me that a method of treating cases of stone impacted in the bile-ducts, which I advocated at the last meeting of the Missouri State Medical Society and have since practised, is not open to the above criticisms, while at the same time it is speedy and appears safe.

The description of a case operated on will give the clearest idea of the method advocated.

R. L. J., aged forty-four, car-inspector, was referred to me by Dr. Pettijohn and Wainwright, of Kansas City, who had diagnosed gall-stone disease, and advised operation. It is unnecessary to give the history and symptoms except to note that jaundice had existed for one year. Operation was performed August 4.

The parietal incision over the region of the gall-bladder was vertical. The omentum was found adherent over the site of the gall-bladder, which was difficult to find. The gall-bladder was the size of a small English walnut, and was deeply seated under the liver.

Adhesions were only separated to the extent necessary to expose the gall-bladder and duct. The general peritoneal cavity, where exposed, was carefully protected by gauze pads and the bladder opened. This viscus merely contained a small quantity of pale, sticky fluid, which was removed by gauze sponges. A stone was felt in the cystic duct, near its junction with the hepatic duct, evidently causing the jaundice by pressure exerted on the latter passage. Endeavors to extract this stone through the gall-bladder having failed, the cystic duct was opened, and the stone (the size of a fairly-large pecan-nut) was removed.

Suture of the wounds in the bladder and duct might have been possible, but as it would certainly have taken much time I decided to drain, but at the same time to build up, of omentum, mesentery, and existing adhesions, a diaphragm between the track of the drain and the general peritoneal cavity. Thus the wounded biliary passages were left open, a few stitches of catgut, judiciously placed, bound together the various structures above mentioned in such a way that in a few hours they became an impervious rampart of adhesions, forming a fistula leading from the biliary passages to the skin.

To obviate any danger of the general peritoneal cavity being contaminated while the adhesions were forming, a rubber drain was passed to the bottom of the wound, and surrounded throughout its whole length with a liberal supply of iodoform gauze.

On August 9 the dressings were found soaked with bile. The gauze pack was removed, and not returned. The bowels moved, the *fæces* being bile-stained for the first time in one year.

The patient made an uninterrupted recovery.

The special features of this operation are,—

(a) The preservation, so far as possible, of existing adhesions.

(b) The leaving open of the wounds in the gall-bladder and ducts, thus saving time.

(c) The formation of a diaphragm composed of peritoneal-covered structures, completely shutting off the general peritoneal cavity from the area operated on.

(*d*) The keeping empty of the cavity bounded by the aforesaid diaphragm and the liver, by means of tubular and capillary drainage.

(*e*) The rapidity, ease, and safety with which an operation by this method can be completed.

Should one find, in course of time, that the obstruction to the flow of bile into the intestine has not been removed, and that an external biliary fistula persists, I can see no reason why this ill also cannot be overcome.

The fistulous track may be gradually or rapidly dilated in part of its course to such a size that an anastomosis can be made between it and a portion of intestine. Such an anastomosis would, preferably, be made by means of the Murphy button, and would permit of the closure of the external fistula. I have had no opportunity as yet to test the correctness of this, but merely offer the suggestion for what it is worth.

EDITORIAL ARTICLES.

OPERATIONS AT THE ZÜRICH CLINIC FOR THE REMOVAL OF FOREIGN BODIES FROM THE ŒSOPHAGUS.¹

THE first really comprehensive and original work upon the subject of œsophagotomy for foreign bodies appeared in the year 1887.² In this article, the author, G. Fischer, presented records of seventy-nine cases which he had collected, partly from literature and by means of correspondence, and partly from his own personal experience. Early in the following year, 1888, the same writer was able to add records of twenty-nine more such operations.³ These were still further increased in 1889 by records of twelve more,⁴ so that finally Fischer's statistics included the results of 120 cases of œsophagotomy. This is without doubt the best and richest collection of the records of such cases which exists, and includes all available records of operations performed between 1738 and 1889, not in Germany alone, but throughout the civilized world. The material is so carefully worked over and so systematically arranged that it is an easy matter to review quickly and thoroughly the essentials of the results.

When we consider that these records cover a period of 150 years, we are at once impressed by the fact that the operation of œsophagotomy for the removal of foreign bodies which have been swallowed is a relatively rare one. A century after the birth of the operation

¹ Beiträge zur klinischen Chirurgie, Vol. XII, Part I. Report from the Surgical Clinic of Professor Krönlein at Zürich. By Dr. August Egloff.

² Deutsche Zeitschrift für Chirurgie, Vol. XXV, p. 565.

³ Deutsche Zeitschrift für Chirurgie, Vol. XXVII, p. 273.

⁴ Deutsche Zeitschrift für Chirurgie, Vol. XXIX, p. 107.

(1738) we find, in spite of the fact that the first operations were successful, only seven such cases are recorded.

With the introduction of antiseptics, however, a better appreciation of this important and often life-saving operation was brought about, and the fear of it, which imbued even such celebrated and bold operators as Dieffenbach, Nélaton, and Fergusson, was finally overcome. Even now we must regard external œsophagotomy as a rare operation, for few have been performed by any single surgeon. As is shown by Fischer's statistics, Billroth, of Vienna, leads the list with eight such operations. Then comes Leroy McLean, of Troy, N. Y., with five cases. Cheever, of Boston, and Von Langenbeck, of Berlin, have each operated four times, and Syme, in Edinburgh, and Von Hacker, in Vienna, three times each. The remaining surgeons on the list have but one or two such operations each.

Dr. Krönlein, Professor of Surgery in the University of Zürich, is now able to present the records of six personal cases. From the figures just given it will be seen that this is a relatively large number, and the record of his results in this field of surgery will not be without interest. A short sketch is also given of those cases in the hands of the same surgeon, where the foreign body has either been extracted *per vias naturales* or has spontaneously escaped from its position.

The following are short histories of the six cases in which Dr. Krönlein has performed external œsophagotomy for the removal of foreign bodies which had been swallowed.

CASE I.—*Æsophagotomy Four Days after Lodgement of a Sheep's Tooth in the Gullet; Cure.*—K. K., male, forty-eight years old, laborer, on October 20, 1878, had the misfortune to swallow the tooth of a sheep while eating his dinner. The tooth was caught in the œsophagus. All efforts at extraction were fruitless, as were also the emetics which were given. At the end of four days the patient was driven by pain and hunger to seek further surgical relief. During these four days the pain of swallowing was so great that only half a cup of bouillon had been taken since the accident.

Status.—The lips and mucous membrane of the mouth were

livid and dry; tongue coated; voice hoarse; breath very fetid. He tried continually to raise the phlegm which collected freely in the throat, but the pain, which he said he felt continually in the region of the episternal notch, was so great that he could not relieve himself. Inspection of the neck showed nothing noticeable. Palpation caused pain just at the left of the notch. A whalebone sound with a metallic bullet-shaped tip, which was introduced into the œsophagus, met with a firm resistance at the same level; the body felt like bone, and apparently completely filled the lumen of the gullet.

With the patient under an anæsthetic efforts were made with various instruments to release the body, but all were without avail; an operation was therefore decided upon.

Operation.—An incision was made on the anterior border of the left sterno-cleido-mastoid muscle from the level of the thyroid cartilage nearly to the episternal notch. The platysma and fasciæ were separated and the large vessels were drawn aside. The omohyoid was divided. The finger was then worked carefully through the connective tissue between the carotid and the thyroid gland, passing behind the trachea down to the side of the œsophagus. The opening of the œsophagus was facilitated by the introduction of a silver male catheter through the mouth. An incision three centimetres long was then made in the œsophagus, and the edges retracted. The finger was introduced into the tube, the mucous membrane of which was greatly swollen, and the foreign body was carefully removed. It proved to be the tooth of a sheep three and two-tenths centimetres long, two centimetres wide, and one centimetre thick. On the grinding surface were several sharp points which were doubtless responsible for the firm fixation of the body.

The operation was quickly performed, and without loss of blood. Disinfection of the wound with carbolic acid. The wall of the gullet was not sutured. The upper portion of the skin incision was closed; a drainage-tube was placed in the lower angle, and the wound treated by the open method.

Convalescence was free from fever. On the eighth day there

was a slight hæmorrhage from the superior thyroid vein; this was easily ligated, and the bleeding did not recur. Food was administered during the first week through an œsophageal catheter. On November 20 he was discharged cured.

CASE II.—*Œsophagotomy on the Seventh Day after the Swallowing of a Set of False Teeth. Death on the Fifteenth Day as a Result of Secondary Hæmorrhage from the Right Inferior Thyroid Artery.*—J. E., male, aged thirty-six, laborer, on the 3d of January, 1883, swallowed a set of false teeth while asleep. The teeth supplied the place of the four upper incisors. He was awakened by pain, and soon vomited some blood, and found that he could not swallow. Two physicians who examined him were able to pass bristle probangs into the stomach and could not detect the presence of any foreign body; they decided that the teeth had passed into the stomach. The patient continued to suffer pain until the fifth day, when there occurred a profuse hæmorrhage from the mouth followed by a second one the same night, and in the morning black passages from the bowels. A third physician was then called who recognized the gravity of the condition and sent the patient at once to the hospital, where he arrived on the 9th of January. During the journey involuntary defecation occurred; the passages were quite black. During the six days but two cups of coffee had been swallowed.

At the time of his admission the man was emaciated, and very anæmic. The pulse was frequent and small. The breath was very fetid. There was considerable swelling about the neck. Palpation and the use of a sound demonstrated the presence of a foreign body in the œsophagus just below the thyroid body. No further attempts at extraction were made, but the operation of external œsophagotomy was begun at once.

The first part of the operation was as before. The œsophagus was held by two silk loops, the catheter was withdrawn, and the œsophagus was then opened between the two threads. The finger of the operator was easily able to feel the set of teeth firmly embedded in the wall of the gullet, about one centimetre above the left clavicle;

the teeth had completely perforated the wall and projected through it. Sequestrum forceps were used to extricate the teeth; there was no bleeding.

The wound was cleansed, and a tampon of iodoform gauze was placed in it between the two threads, which were left in place. The neck was covered with an absorbent dressing and gutta-percha tissue.

The patient was given nourishment through a stomach-tube immediately after the operation, and for the next fifteen days made steady, though slow, progress towards recovery. After a few days he could swallow and was fed with a spoon. There was a slight rise of temperature for the first week, but this soon subsided, and he gained in health and strength.

On January 24, while sitting quietly in bed, a profuse arterial hæmorrhage occurred from the mouth, followed, after a short interval, by a stool containing masses of pure blood. Collapse and death in a quarter of an hour.

The post-mortem examination showed that the wound of operation in the wall of the œsophagus was almost entirely healed. On a level with the lower angle of the wound there bulged into the lumen of the tube a thrombus mass the size of a hazel-nut, which partially closed an orifice existing at this spot, and which proved, on passing a probe, to be the open end of the right inferior thyroid artery. The walls of the vessel and of the œsophagus in the neighborhood were very thin and the surrounding tissue was infiltrated with blood. The destruction of tissue and the resulting perforation was due without doubt to the necrosis produced by the pressure of the foreign body during the week that it remained in the œsophagus.

CASE III.—*Œsophagotomy Thirteen Hours after the Swallowing of a Set of False Teeth; Cure.*—The patient, a young woman, twenty-one years of age, was accustomed to remove the teeth each night, but on the evening of March 1, 1888, she forgot to do so for the first time. She awoke in the middle of the night to find that they were gone, and from the sensation concluded they must be in the œsophagus at the level of the episternal notch. Physicians were called at once,

and attempts were made to remove the teeth. One of these efforts with the bristle probang was nearly successful, but they escaped again. She was then sent to the hospital for operation. On the way thither she had several attacks of vomiting; the vomitus consisted of slime stained with bile and containing some blood. She complained of a sharp burning pain in the neck.

On arrival in the hospital the girl was found to be in good condition. The secretion of saliva was greatly increased. There was a slight tumor (a parenchymatous struma) on the left anterior aspect of the neck. By the use of sounds it was determined that the teeth were firmly fixed in the throat a little above the episternal notch. Efforts at extraction were again made, but were unsuccessful.

The operation of œsophagotomy was performed thirteen hours after the accident. As in the former cases, the omohyoid muscle was divided. The lobe of the thyroid gland was pushed aside and the superior thyroid artery, which was exposed to view, together with the other vessels were retracted. The œsophagus was easily recognized without the aid of a catheter, and the irregular outline of the foreign body was easily made out through its walls. The œsophagus was held by means of double-pointed sharp retractors, and an incision three centimetres long was made in it. The edges of this wound were then held by two silk loops. The teeth were easily extracted by the use of sequestrum forceps.

Since there was no erosion of the œsophageal walls, a continuous catgut suture was used to hold them together. A portion of the skin wound was sutured; the remainder was lightly tamponned with iodoform gauze.

For the first ten days after the operation there was considerable pain about the wound, and some slight discharge of serous odorless fluid from the wound. The temperature, too, was moderately elevated for a week. After the fourth day patient could drink milk and similar food without trouble, and without any leakage through the wound. On March 29 she was discharged; the wound had then completely cicatrized.

CASE IV.—*Œsophagotomy on the Eleventh Day for the Removal of a Piece of Bone; Cure.*—On April 25, 1891, the patient, an inn-keeper, fifty years of age, swallowed a piece of bone while he was eating some soup. The splinter remained sticking in his throat, and the various means which were tried for the purpose of dislodging it were unsuccessful. Since the presence of the bone caused but little distress, and he was still able to swallow, he took no further measures to relieve himself until the 29th of the month. The physician who was then called tried several times to remove it, but did not succeed; the patient on his part declared that it had been pushed on into the stomach and nothing further done for six days more. At last hunger, diarrhoea, and bloody stools compelled him to call another physician, who sent him at once to the hospital.

This was on May 6. Examination showed that there was some swelling of the neck and tenderness on pressure beneath the inner border of the left sterno-mastoid muscle. The breath was very offensive. The metal tip of a whalebone sound was able to demonstrate the presence of a foreign body eighteen centimetres distant from the teeth; the lumen was not greatly obstructed and the sound could easily be passed into the stomach.

As all efforts to dislodge the bone were unavailing, an operation was at once decided upon. The only incident in the course of the operation of exposing the œsophagus was a free hæmorrhage from the eroded superior thyroid artery. This was easily controlled, and the œsophagus was opened for a distance of two centimetres. The body was found and easily removed with sequestrum forceps; it proved to be a piece of the skull of a pig.

The two loops of silk which had been used as retractors were then removed, and, in spite of the fact that the bone had been in the gullet for eleven days, the walls of the tube were closed with three silk sutures. Disinfection of wound with 1-1000 sublimate solution and closure of all save the lower angle, where a drainage-tube was placed, together with the ends of the sutures.

Convalescence was marked in this case by a number of internal

hæmorrhages with masses of blood in the stools; the loss of blood in this way was so great that the number of red blood-cells was reduced to 1,260,000, and hæmoglobin to 19 per cent. On several occasions he fainted. During all this time the external wound appeared quite normal. He gradually recovered, and on June 28 he was discharged cured.

CASE V.—*Œsophagotomy for the Removal of a Set of Teeth Eleven Hours after they were Swallowed; Cure.*—Mrs. S., thirty-two years old, had been in the habit of keeping her false teeth in place day and night for some years. On December 29, 1892, she had the misfortune to swallow them. Notwithstanding the fact that the passage of a sound into the stomach was easily accomplished, and that no obstacle was found, the physician who was called sent the patient directly to the hospital for operation if that should be found necessary.

The patient did not suffer pain, nor was she unable to eat. Whalebone sounds with metal and with ivory tips were used; both passed into the stomach easily, and only on their withdrawal was it possible to make out the presence of a foreign body in the œsophagus, twenty-two and a half centimetres from the teeth. Efforts at extraction were fruitless, and, therefore, œsophagotomy was performed eleven hours after the teeth were swallowed.

After the œsophagus was exposed in the usual manner, a catheter was introduced through the mouth; two threads were placed in the wall of the gullet as retractors, and an incision two centimetres long was made in the wall. Profuse vomiting of very viscid mucus followed, and the wound was filled with it. The finger was able to feel the foreign body without much difficulty, and it was removed with a long pair of forceps. The œsophageal wound was closed with two silk sutures in the mucous membrane and four in the muscularis. The rest of the wound was tamponned with iodoform gauze around a drainage-tube. The upper portion of the skin incision was also closed with silk sutures.

The patient was given food through a tube for four days, and then was allowed to swallow in the ordinary manner; but it was found

that the water used as a test passed out through the wound; the tube was therefore resumed. On January 14 the fistula had entirely closed, and on the 21st the wound was completely healed.

CASE VI.—*Œsophagotomy after Twenty-three Hours for the Removal of a Piece of Meat; Cure.*—Eight years previous to the present accident the patient swallowed a piece of bone, for the removal of which œsophagotomy was performed after four days. Towards the end of the three months that he spent in the hospital at that time, a somewhat large piece of meat caught in the gullet at the same place where the bone had been; with great effort this finally passed into the stomach. A third time that this happened a sound was necessary to cause the piece to pass. In 1889 a similar accident occurred; this time the physician improvised a sound out of a willow twig and pushed the piece into the stomach.

On November 21, 1893, while he was hastily eating dinner, a piece of the meat, not very well cooked and scarcely at all masticated, was swallowed, and remained sticking in his throat. Various efforts were made to dislodge it, but all were unavailing. He was brought to the hospital on the same day.

In this case even water was completely prevented from passing into the stomach. A sound showed the obstruction to be 22.5 centimetres distant from the teeth. The foreign body was very firmly fixed, and the entire lumen of the tube was occluded. The patient would not consent to an operation until the following morning.

The operation was more difficult than the others described. The incision was made twelve centimetres long and along the old scar. The platysma, omohyoid, and fasciæ were bound together, and were not as easy to recognize as usual. The left lobe of the thyroid, as large as an egg, was held towards the median line, while the great vessels in their sheath were drawn outward. The superior thyroid artery was very large. It was divided between two ligatures, as it lay directly upon the œsophagus in the field of operation. The œsophagus was opened on a catheter for a distance of two centimetres. The tough piece of meat was found fast in the tube at a level with the

bifurcation of the trachea. It was removed piecemeal with curved throat forceps. The entire piece was of the size of a small hen's egg. The lumen of the œsophagus was a trifle narrowed at the point of lodgement, but was otherwise as usual.

The mucous membrane was sutured with five silk sutures, the muscularis with catgut; 1-1000 sublimate solution disinfection; iodoform gauze packing about a small drainage-tube; upper angle of the wound closed with silk.

Patient was given small bits of ice and teaspoonfuls of lemonade to swallow. Nutritive enemata were used instead of feeding through a catheter for the first day. The stomach-tube was then used till the 28th of the month, after which time he was allowed to swallow food. On December 18 the wound was completely healed.

When these six cases are carefully considered, the following points of interest may be noted:

There were five cures to one death; but it is not to be considered that in the fatal case the result was due to the operation. On the contrary, it occurred in spite of the operation, the long pressure of the teeth produced the lesion, the thrombus was in some way loosened, and the catastrophe followed. In all the other cases the convalescence was either quite uninterrupted or broken only by minor disturbances.

In Case I a slight hæmorrhage followed an attack of coughing, and rendered the ligation of the superior thyroid vein necessary. In Case III there was a slight rise of temperature for the first week, due in all probability to the retention of a small amount of secretion in the wound, or possibly to the slight bronchitis which existed. On the other hand, it is to be noted that the patient was able to swallow fluids as early as the third day without there being the slightest escape through the wound.

There was a favorable outcome in the fourth case, too, notwithstanding the fact that the bone had been in the œsophagus for eleven days, and that at the time of the operation, and later, there were symptoms pointing to an erosion of the walls of the tube. The

anæmia which resulted from the repeated attacks of hæmorrhage, although so severe as to threaten the life of the patient, was, nevertheless, recovered from in a short space of time. In this case the wound in the œsophagus was not completely closed until the twelfth day.

In Cases V and VI the times of closure of the œsophageal wound were approximately equal. The last case is especially noteworthy, since there was a narrow escape from the same operation twice in eight years, and it finally had to be performed after all. There was without doubt a moderate stricture left after the first operation, and, perhaps, as a result of the traumatic muscular insufficiency, a slight degree of paralytic dysphagia. Such a case is of the greatest rarity. Only one similar is recorded in literature. Billroth operated on a woman in 1878, and again in 1885, both times for the removal of a plum stone lodged in a stricture of the œsophagus.

These cases show that the danger of a second operation is no greater than in the first instance. A stricture of the œsophagus as a result of the operation is a rare occurrence, and the case just described is an exception to the rule.

Without going into details, it may be stated that Professor Krönlein has in ten other cases been able to remove foreign bodies from the œsophagus, either with the "coin-catcher" of Von Gräfe or with the œsophageal forceps. In six more cases the foreign body was dislodged spontaneously, and was passed from the rectum.

The rôle which sets of artificial teeth play in the history of this subject demands attention. Besides the high percentage in the six cases which are here described, it is remarkable that since 1856, when the first case of the kind is recorded, 35 per cent. of all cases of external œsophagotomy were for this class of bodies; the mortality shown is 23.8. The question arises, Is this due to the faulty construction of the teeth, or does the fault lie with the persons who use them? Those cases where the teeth are not removed during sleep, or where they are worn when the plate is known to be defective, certainly belong to the latter class. On the other hand, when they are

dislodged by mere laughing, yawning, eating, or drinking, they belong to the former. In some cases, however, teeth which have been apparently perfectly sound break suddenly during eating, and in the same instant are swallowed. To avoid such accidents as far as possible the plates must be well constructed originally, and they should be examined from time to time by a competent dentist. A certain amount of danger still remains, and persons who are obliged to use false teeth should be warned of it, and should be taught to observe all reasonable precautions.

Fortunately, in the majority of cases, foreign bodies lodged in the throat can be dislodged without the operation of *œsophagotomy*, especially when the body is rounded or has no sharp points which can catch in the mucous membrane. If the lumen be not entirely occluded, suitable instruments may extricate the article without recourse to the more severe operation. Oftentimes the individual is able by efforts of swallowing either to regurgitate the substance or to cause it to pass into the stomach, where it passes on into the intestines without further difficulty.

For the examination of the gullet, Dr. Krönlein, in those cases where the index finger is unable to feel the body, uses first the ordinary English *œsophageal* sound, or else one with a metallic tip. The latter has the preference, since it is often possible to hear as well as feel the striking of the tip of the sound upon the foreign body. If it can be felt with the finger, and this is better tried under an *anæsthetic*, then the extraction is usually easy with *œsophageal* forceps, using the finger as a guide. Should its situation be lower down, the "coin-catcher" may be tried with a good chance of success. Occasionally the sound may be able to cause the body to pass into the stomach. This last-mentioned procedure is only to be recommended in the case of soft and digestible substances, or those solid bodies which are not firmly fixed in position, and which have a blunt and rounded outline which will not cause damage. Pointed, irregular, and indigestible bodies, on the contrary, may easily do damage to the walls of the *œsophagus* during such manipulations, and even if

they reach the stomach in safety, the individual is not free from danger.

The very dangerous method, which, strangely enough, is recommended by Dieffenbach, of administering an emetic after efforts at extraction have failed, is never attempted by Professor Krönlein, even when a soft piece of meat is the offending body. Certain it is that the mouthful may oftentimes be expelled by such a measure, but the violence of the act of vomiting may easily cause a rupture of the oesophageal wall, and subsequent to this the death of the victim. For similar reasons the use of the "coin-catcher" should not be carried too far, for pointed bodies in the grasp of this instrument can wound the previously unbroken wall of the gullet.

There have been many cases recorded where bodies have been swallowed, and with the aid of such food as plenty of potatoes, beans, or peas have passed the entire length of the intestinal tract; some of a character as would seem almost incredible. Some cases, of course, even after they are in the stomach, may cause further trouble, and render an early gastrotomy advisable. Others have passed into the intestine, and there, by reason of pressure long continued, cause necrosis, and eventually localized abscess, or general peritonitis. Some even have worked their way to the surface of the body, being shut off from doing further damage by adhesions.

In the matter of diagnosis it is to be remembered that because a sound can be passed freely into the stomach it does not follow that there is no foreign body lodged in the oesophagus. One of the above cases emphasizes this fact, when the sharply concave shape of the plate of teeth is remembered, and the manner in which they lay close against the wall, it is easy to see how such an error could occur.

On the other hand, cases occur where the patient has declared that there was a foreign body in the throat when it was *not* there. Thus in one case¹ the teeth which a woman was absolutely certain were sticking in her throat were found under the bureau in her room.

¹ Swiss Dental Quarterly, Vol. III, Part II, June, 1893.

The so-called "globus hystericus" may also be the means of deceiving both patient and physician. The diagnosis, therefore, is not always so simple as it would appear.

Statistics show that the most frequent site of lodgement is in the cervical portion of the œsophagus, and next most frequent in the upper region of the thoracic portion; rarely as low as the cardiac portion. The situation has, of course, an important bearing upon the ease with which an œsophagotomy can be performed.

Indications for Œsophagotomy.—Most modern surgeons now agree that the operation should be performed as soon as possible after the bloodless methods of extraction (*vide supra*) have been tried, and have proved unsuccessful. If there has already been bleeding from the mouth, or if symptoms of infiltration are present in the cervical region, the simpler methods should not be attempted. At the present time it is not justifiable to wait for a possible spontaneous passage of the foreign body after ordinary means of extraction have been tried and failed. Inflammatory and often purulent processes with necrosis, and possible perforation of the wall of the œsophagus will almost certainly occur if the body is allowed to remain for any considerable length of time. These processes may, and often do, lead to retro-pharyngeal abscess, and to pleuritis, or to pericarditis. Pneumonia, gangrene of the lung, and fatal hæmorrhage from the erosion of various vessels are also unpleasant results that have followed the treatment by procrastination (König).

The method of operation which Krönlein recommends is that described by Guattani, and is as follows: Incision along the anterior border of the left sterno-mastoid from the level of the thyroid cartilage down nearly to the episternal notch. Division of the platysma and of the superficial fascia of the neck, also of the deep fascia and of the omohyoid muscle, when this cannot be sufficiently retracted. The finger is now used to separate the lateral wall of the thyroid gland and of the trachea, which are to be pushed towards the median line, from the great vessels which, still in their sheath, are to be pushed to the right. Other vessels, such as the superior or inferior

thyroids, can usually be avoided ; where they cause trouble they should be divided between two ligatures. The presence of a pre-existing struma, or of an acute inflammation of the cervical glands, or of the thyroid gland from recent infection, may add somewhat to the difficulty of this procedure. If a foreign body of some size has been for several days in the gullet at the level of the cricoid cartilage, it may, by pressure upon the larynx and the swelling which occurs, cause difficulty in breathing, and a secondary enlargement of the thyroid gland, owing to the congestion of the blood in the veins (Von Langenbeck).

The œsophagus can often be recognized without the necessity of introducing either the so-called "ectropœsophagus" or the simpler male metallic sound or catheter ; in some cases, though, this procedure is necessary. The drawing of the larynx and trachea to the right to facilitate the exposure of the œsophagus is often impossible, on account of the difficulty of breathing which this procedure causes. The recurrent nerve between the trachea and œsophagus can be avoided by always making the œsophageal incision on the side wall, either directly over the foreign body or upon the introduced instrument ; the tube is to be steadied while the incision is being made either with sharp retractors or, better still, by two long silk sutures through the muscular wall, which act as guy-ropes, and are used later on to hold the walls apart while the foreign body is extracted.

In most cases the foreign body can be easily removed with œsophageal forceps or with sequestrum forceps ; rarely the use of a thin elevator is necessary.

The question of suture or non-suture of the wall of the œsophagus seems to be best answered by the condition of the wall at the time of the operation. Should the tissues be ulcerated or infiltrated with septic deposits the former method of open wound treatment is best ; in sound and healthy tissues sutures had better be used. Although the separate suture of mucous membrane and of muscularis tends to avoid separation and subsequent contraction of the parts, still, this can never be absolutely relied upon. There is no question but

that the using of sutures reduces the time of union to a minimum, and in some cases, as in one of the present series, primary union may take place. Ordinarily, the length of time that is required for the wound to be impervious to fluids that are swallowed varies from ten to fourteen days.

The treatment of the rest of the wound depends also upon the condition. If it were possible to suture the œsophagus, then a small drain and a light strip of iodoform gauze were laid in the lower angle of the wound, and the upper portion is sutured with silk; an aseptic dressing is applied over all. Where suture of the œsophagus was not desirable, the entire wound, with the exception of the upper portion, which can always be sutured more or less, is lightly packed with iodoform gauze and allowed to heal by granulation.

Feeding is best done by means of a soft stomach-tube; but this should be continued only so long as the permeability of the œsophageal wound continues.

H. P. DE FOREST.

BRUNS ON THE RESULTS OF CONSERVATIVE TREATMENT OF TUBERCULOUS COXITIS.¹

It was formerly the custom, when reporting the results of any especial method of treatment, to give the condition of the patient at the time that he was discharged from the hospital or at the end of the treatment of the immediate attack; nowadays, however, following the example of Billroth, the endeavor is made to learn the ultimate results, and frequently this cannot be done until after years of observation.

Long duration of observation is especially necessary in cases of tubercular coxitis, for this disease is pre-eminently characterized by

¹ Professor P. Bruns, of the Tübingen Surgical Clinic, *Beiträge zur klinischen Chirurgie*, Vol. XXII, Part I, Tübingen, 1894.

the chronicity of its course. It is always unpleasant to consider, even after months of treatment, how little the future result can be foreseen, how problematic is real benefit derived from the treatment, and what will be the ultimate fate of the patient. What prospect has he for a complete recovery from the joint affection, and what will be the result as regards the usefulness of the limb? Or, what are the chances of his succumbing either to the disease of the joint itself or to general tuberculosis?

These various questions present themselves in every case of the disease, and even yet there is as little known concerning the natural course of the disease as there is about the really ultimate results in those cases where conservative or operative methods of treatment have been pursued. It is universally admitted that the statistical tables are in part incomplete, and in part unreliable; now the material is too small, now the time of observation is too short, now the various forms of coxitis—rheumatic, osteomyelitic, tubercular, infectious, deforming—are not properly differentiated, now either the stationary forms alone or the recurrent forms are collected and discussed.

Billroth himself laments the fact that his own statistics are sadly mixed, since they embrace only stationary cases, and hence a separation of the cases of tubercular coxitis from those of the so-called coxitis rheumaticus adolescentium is impossible. The followers of Billroth have labored under the same difficulty in their continuance of the histories of the cases; the subsequent history or subsequent examination of the cases is absent in many cases.

Professor Bruns and his assistant, Dr. Wagner, have recently made the effort to collect all of the histories of cases of coxitis, tubercular in character, which have occurred in the surgical clinic at Tübingen during the past forty years, and to make as thorough investigations as possible of the ultimate course and outcome of the disease; their records are of great value in forming a just estimate of the various methods of treatment. The population residing in the neighborhood and in the little cities of Württemberg is quite fixed, and with the assistance of the authorities it was possible, in nearly all instances,

to discover the whereabouts of the former patients at the clinic. Records of 600 cases of this form of coxitis were collected. The cases who were kept in the hospital for some time, as well as those who came to the ambulatorium for treatment, were combined. The total will include slight and severe forms of coxitis with the various gradations of the disease as they occur in an extensive territory, and during a long period of time. The most important result of their labors was that the majority of the patients still alive, over 200 in number, were carefully examined. News of the others was obtained by inquiry, with the assistance of a large number of physicians throughout the country.

The numerous examinations, made in some cases years after the beginning of the disease, are of special interest. They were really essential in order to correct any cases of mistaken diagnosis made at the beginning. Many surprising discoveries were made regarding other affections, which can be confounded with tubercular coxitis. One of these was that a considerable number of cases designated in the records as "beginning coxitis" or "chronic coxitis" should really be classed with the disease first described by Ernst Mueller¹ in 1888, under the name of "Schenkelhalsverbiegung" (bending of the neck of the femur). While this disease was formerly considered a rarity, later investigations have shown that it is not very uncommon, and therefore is of great practical interest. The picture of the disease is quite a characteristic one, as has been shown at the Tübingen clinic by the careful study of more than thirty cases. There is no doubt, moreover, that this condition, which, perhaps, can be best described by the name of *coxa vara*, should really be classified with the typical deformities developing during the years of growth; it closely corresponds with *genu valgum*, the latter being a disturbance of growth of the lower, the former of the upper, end of the diaphysis of the femur. Since this affection, *coxa vara*, begins like coxitis, with a more or less marked period of pain and disturbance of function, the two diseases

¹ E. Mueller, Ueber die Verbiegung des Schenkelhalses im Wachstumsalter, ein neues Krankheitsbild, Beiträge zur klinische Chirurgie, Vol. IV, 1888, p. 137.

are easily confounded. Many so-called "obscure" cases of coxitis are really cases of *coxa vara*, and as well as most of the cases described by Billroth as coxitis rheumaticus adolescentium.

Still another interesting fact was developed by the opportunity thus afforded of examining an extremely large number of cured cases of coxitis. The examination showed that coxitis, as a result of infectious osteomyelitis of the upper end of the femur, is not so rare an occurrence as was formerly believed. The hip-joint is peculiar in this respect, since the upper end of the diaphysis, the neck of the femur is, for the most part, intra-articular. König long since called attention to these cases, and their differentiation from those of tubercular coxitis; the distinction, according to this authority, lies principally in the acute or subacute beginning of the joint inflammation, as opposed to the imperceptible onset of tuberculosis of the hip-joint. Bruns's investigations prove, however, that the osteomyelitic form of coxitis may also have a chronic beginning and progress, so that the differentiation from the tubercular form may be very difficult. The course can be mild or severe, and with or without the formation of pus and fistulæ. Frequently the further course and result show the true character of the lesion. In the one case a cortical sequestrum will ultimately be thrown off; in the other, acute sequelæ or recurrence of the coxitis takes place, or after the cure a scar, depressed and firmly united with the bone, may be left, or an unusual shortening of the thigh from interference with the area of growth remains,—observations which can only be made a long time after the clinical examination.

The investigations showed some fifty cases of osteomyelitic coxitis, which pursued a subacute or a chronic course. Since the prognoses of these are much more favorable, their omission from the statistics is important. This is a point which deserves much future consideration, and must also be especially considered in the collection of statistics regarding resection of the hip-joint.

All cases were rejected whose duration was less than one and a half years, as well as those that had been cured with no disturbance

of function. Although the possibility that tubercular coxitis may be cured with no interference with joint mobility is not denied, the exclusion of this class of cases shuts out a number of cases of doubtful diagnosis as well as rheumatic and rheumatoid forms, which do not properly belong to the subject under investigation.

These various classes that were thus rejected, together with those of which no sufficient information could be obtained, reduces the number of patients who suffered from true coxitis to 390. Of these, 321 were treated conservatively; 69 had resection performed. The author's conclusions, as to the prognosis with conservative treatment, are as follows:

(1) Tubercular coxitis occurs almost exclusively during the first two decades of life. Forty-eight per cent. occur in the first decade, 37 per cent. in the second decade, and but 6 per cent. in the third.

(2) In one-third of the cases of tubercular coxitis the disease pursues its entire course with no manifest formation of pus; in two-thirds of the cases an abscess develops with rupture and fistula formation.

(3) Fifty-five per cent. of all cases of tubercular coxitis treated conservatively are cured. The time required for a cure averages four years.

(4) Death resulted in 40 per cent. of the cases; for the most part due to the development of tuberculosis in other organs, particularly the lungs and meninges, or to a general miliary tuberculosis. In the fungo-purulent form death was usually due to amyloid degeneration, progressive suppuration, and septic infection. Death occurred after an average duration of the disease three years in length.

(5) In individual cases the ultimate result is markedly influenced by the occurrence or non-occurrence of suppuration: in the non-purulent form 77 per cent. were cured, in the fungo-purulent, only 42 per cent. The occurrence of suppuration within the joint more than doubled the mortality (23 per cent. to 52 per cent.).

(6) Of great importance in the prognosis is the age of the patient at the beginning of the sickness. As a rule, the prognosis

became worse with the increase of age: the first decade gave 65 per cent. of cures; the second, 56 per cent.; the third and fourth, only 28 per cent.; and the fifth and sixth decades, 0 per cent. In the fungo-purulent form there were practically no cures when the patients were more than twenty years old.

(7) Of those persons who were really cured of the tubercular coxitis many suffered subsequently from tuberculosis of other organs. Of these 6 per cent. died of phthisis during the first decade, 9 per cent. during the second decade, and 7 per cent. during the third and fourth decades.

Let us now turn from this gloomy record to a consideration of those who are cured. The view is a gratifying one. Many, who as children, were miserable and apparently incurable, are now, ten, twenty, and thirty years afterwards, healthy in appearance, and even physically robust; not many really deserve the name of cripple. It must be acknowledged that these investigations are the more gratifying from the fact that the majority of those who recovered have preserved the use of the limb, and even where marked degenerative changes existed are now able to earn their livelihood in many fields of labor. In all, it is true, the gait is more or less limping, the leg is atrophic to a varied degree and almost always shortened, the hip-joint is partially or entirely immovable as a result of contracture; yet most of them do not use crutches and can even travel long distances.

The results as regards function are, as a rule, more favorable than could be expected. Attention is drawn to one point in particular by the author. The motion at the hip-joint is, without exception, notably limited or entirely wanting. In general, it can be said that in one-third of the cases cure has been followed by a partial ankylosis; in two-thirds the ankylosis is complete, or nearly so. It is to be understood that the occurrence or non-occurrence of suppuration greatly modifies the result; in the non-purulent form 50 per cent. developed ankylosis; in the purulent, 80 per cent.

With rare exceptions the contracture was a typical one, but

varied in degree; flexion was almost always present; in two-thirds of the cases it was accompanied by adduction, in one-third by abduction. The contracture is, of course, compensated, as far as possible, by tilting of the pelvis; but since the flexion in some cases is nearly a right angle, and adduction as high as forty-five degrees, the apparent shortening is very marked and walking is difficult. This angular position, and not the shortening, is by far the greatest hindrance to locomotion,—this fact cannot be too greatly emphasized in the consideration of treatment.

All cases were accurately measured to determine the amount of shortening and, as far as possible, the cause for the same; the cause in some cases is not evident.

First let us consider the absolute shortening dependent upon a stoppage of growth in the femur. This is scarcely ever lacking when the disease occurs in childhood, but it occurs also after the completion of growth to the amount of one to two, or, exceptionally, three centimetres. Is the cause of this limitation of growth to be sought in inactivity alone, or is there a lesion of the epiphyseal cartilage? In the majority of cases shortening also occurs in the leg and even in the foot; it therefore seems probable that this shortening is due to inactivity. A higher degree of absolute shortening is considered by Professor Bruns to be caused by an infectious osteomyelitis rather than by tuberculosis, since an injury to the epiphyseal cartilage is not uncommon in the former disease.

Another form of actual shortening, arising from the higher position of the great trochanter upon the pelvis, is present in about four-fifths of the cases; the amount of shortening is considerable, and averages four centimetres. The cause of this is almost always a destructive change of the femur or the acetabulum. Where the great trochanter is situated noticeably high, there can usually be felt a well-developed bony wall on the outer surface of the ilium, but the head of the femur cannot be felt. In a few cases examined the femur was dislocated, and its atrophied head could be felt before, behind, or above the acetabular ring. These facts show, that in tubercular cox-

itis a change of position of the acetabulum is much more frequent than a true spontaneous luxation. The result is that the typical position of the leg is not so greatly different from the normal as in a true dislocation, and the chance of retaining a useful leg is much more probable.

Besides the actual shortening, account must be taken of the apparent shortening due to the inclination of the pelvis; this may equal or even exceed the other in degree.

When the actual and the apparent shortening are taken together, as they actually occur, the average total is seven centimetres, and often as much as ten or twelve centimetres. The majority of the persons examined had remedied the condition, in part at least, by the use of a thick-soled shoe; others declared that they could get along better without this.

These, then, are the essentials of the results obtained. They are about midway between the widely-differing figures obtained by other observers. This is easily accounted for by the fact that they include, not merely a single class of cases, but the entire number of cases of tubercular coxitis occurring in a long period of time. The figures must, therefore, closely approximate the real facts. The results are especially gratifying when it is considered that such pessimistic views as those of Hueter, who says, "Suppuration in the hip-joint is an almost absolutely fatal process," may now be cast aside. And yet these views have led surgeons to believe that the only treatment which promised cure in such cases was the early resection of the joint.

The practical question at once suggests itself, To what method of treatment do these results point? "I have voluntarily omitted the consideration of this question till now in order that the favorable or unfavorable comparisons which might have been made should not influence a just estimate of the results." It is to be remembered that these observations cover a very long period of time, during which there have occurred many fundamental changes in the therapy of coxitis: first the period when derivative measures were employed,

—blisters, moxæ, bloodletting, and hot irons; then the period of mechanical treatment, first with extension apparatus, then by means of weights, then by the use of hardened bandages; finally, the recent period of treatment by means of iodoform, which seems to promise favorable results.

The particular cases which have been made the basis of the present investigation have had even more methods than these tried. Owing to the negligence on the part of the country folk in many of the ambulatory cases the treatment was really nominal; of those who were obliged to stay in bed, the regular treatment was continued only so long as they remained in the hospital. In most of the cases, therefore, we cannot consider the result as dependent upon any especial method of treatment. The iodoform treatment in particular was tried on but few persons, and cases of coxitis first seen during the past three years are excluded from these statistics.

The results are those derived from conservative treatment in general, and not from any especial method. The most severe cases are also included. The objection that most of the worst cases were subjected to a resection has really no weight, for the majority of the patients were treated at a time when resection was rarely, if ever, performed.

It will be seen at once that these results must finally be compared with those obtained by the two specific forms of treatment,—resection and the iodoform method.

So far as the use of iodoform is concerned, the period of time that it has been in use is too short to form a just estimate. As regards resection, our views must be modified at the outset by the fact that the records show that about two-thirds of the deaths were due to general tuberculosis or else tuberculosis of other organs; one-third only were caused by the suppuration within the joint, and its sequelæ (amyloid, exhaustion, septic infection). The mere excision of the tubercular joint cannot materially lessen the danger to life from these causes. In fact, a comparison of these statistics with those of resection shows that the mortality is not lessened by the latter procedure,

and in the preservation of function the balance is greatly in favor of the conservative treatment. The various statistics concerning resection, too, are now of little value, since they include cases which were operated upon during the pre-antiseptic era; a new collection of records of resection must be made, including a large number of cases, and only those which were treated by modern methods of operating and of technique an accurate estimate can then be made of the true value of the operation. One thing, at any rate, may be considered as well demonstrated. When systematic methods of conservative treatment have failed to get a good result, resection should be the method next employed.

H. P. DE FOREST.

INDEX TO SURGICAL PROGRESS.

GENERAL SURGERY.

I. The Eczema of Surgeons. By Dr. O. LASSER. In the consideration of this subject, the ordinary description of eczema as an exactly defined clinical identity cannot be maintained. Surgical eczema presents a variety of inflammatory reactions of the skin due to definite exciting causes. While many other diseases of the skin are obscure in their etiology and pathology, the eczema of the surgeon is characterized by certain circulatory disturbances of the skin with hyperæmia, exudation, exfoliation, formation of papules, and bullæ. Healthy young men, who have never had occasion to pay attention to the state of their hands, often after their entrance into the field of surgical work suddenly develop an inflammation of the skin of the hands, with burning and itching. The skin becomes swollen, red, and tender. This condition does not always come on at the beginning, and may be slow or sudden in its onset. The course of the disease is very simple. Every human tissue has its limit of resistance. The causes of these changes may be due to chemical action, heat, or the mechanical action of rubbing. First is observed a slight redness of the skin with some heat and swelling. The originally smooth, soft skin becomes broken and cracked. The subcutaneous lymph-channels are broken open, and the lymph transudes and coagulates upon the surface. The exudation of plasma causes pressure upon the nerve-endings. The surface is scratched. The surgeon who purposely refrains from scratching the surface, does scratch it unconsciously during sleep. The small openings into the lymph-channels are thus infected, and the trouble is aggravated.

A discontinuation of the use of the hands does not always mean that the attack will not recur when the hands are again put into use.

The same application which excited the first attack is apt to cause another attack when again used. The washing of the hands with soft soap and a hard brush, rinsing in hot soda solution, creolin, or acetic acid are procedures which no washer-woman could practise, much less the more finely organized surgeon. Soft hands should be washed with good soap, and then, before drying, some oily substance should be applied. For this purpose the best is a mixture of olive oil, glycerin, lanolin, and vaseline, in equal parts with 2 per cent. of resorcin.

If eczema develops, notwithstanding this prophylaxis, the chief precaution should be taken in preventing the admission of bacteria into the cracks in the skin. The best antiseptics for these cases are the tar products, such as creosol and benzole. They are best used not in the form of ointments, but as oils dissolved in alcohol. Fortunately the ordinary wood-tar can be easily removed from the diseased skin, and is itself an excellent application. This can be applied copiously once daily, towards evening, and washed off in warm water after half an hour. Then for the night a 2 per cent. salicylic paste or zinc paste (zinc. oxid. 60.0, ol. oliv. 40.0) can be thickly applied, and covered with a cotton and mull bandage. Under this treatment the itching quickly disappears, and also the infiltration and hyperæmia.

Another good method of treatment is the application of

Beta-naphthol,	10.0
Sulph. sublim.,	40.0
Sapon. virid.	
Vasellini,	ââ 20.0

This is applied first, and then after ten or fifteen minutes is replaced by a 25 per cent. chrysarobin-lanolin mixture. After this comes the tar, and the subsequent all-night dressing as above. This last can be also made of 10 per cent. white precipitate, 10 per cent. pyrogalllic acid, and 70 per cent. lanolin.

When impetiginous crusts and pustules form, they can be quickly cured by a salve, composed of one part of cinnabar, twenty-five parts

of sublimated sulphur, and seventy-five parts of vaseline, with a few drops of bergamot oil. It is important that a light absorbent dressing be applied over night. In very severe cases scarification can be resorted to to hasten the removal of the exudate and relieve the over-distended capillaries. Any irritation from strong applications is to be guarded against. *Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

II. Statistics of Narcotization (Fourth Series, 1893-94).

By Dr. GURLT (Berlin). During the past year there have been reported 33,083 chloroform narcoses, 11,669 ether, 3896 mixed chloroform and ether, 750 chloroform-ether-alcohol mixture, 2986 bromethyl (in 169 cases combined with chloroform, ether, or both), and 91 nitrous oxide. When the last, which is used only by dentists, is omitted from the number, 52,384 narcoses with 21 deaths remain = 1 : 2494. The figures for four years are 166,812 chloroform narcoses with 63 deaths = 1 : 2647; 26,320 ether narcoses with 2 deaths = 1 : 13,160; 8014 mixed chloroform and ether with 1 death = 1 : 8014; 4190 chloroform-ether-alcohol mixture with 1 death = 1 : 4190; 7541 bromethyl with 2 deaths = 1 : 3770; and 597 pental narcoses with 3 deaths = 1 : 199.

During the past year chloroform has given an especially large mortality,—1 : 1946; ether has given 1 : 5834. In Germany the employment of chloroform has diminished (33,000 against 38,400), whereas the use of ether has increased (11,600 against 6200); and chloroform and ether mixed (3800 against 1200) and bromethyl (2900 against 2000) have also been used more frequently. Among the 3182 anæsthetizations with Pictel's glacial chloroform two deaths are reported.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXXIII Kongress, 1894.

III. Physiological Function Assumed by a Thyreoid Metastasis.

By Dr. VON EISELSBERG (Utrecht). In the spring of 1886 Von Eiselsberg did a total extirpation of a goitrous thyreoid for compression of the trachea. Microscopic examination showed

numerous adenomatous nodules scattered throughout the colloid tissue. The case progressed smoothly. Soon after the patient returned home symptoms of cachexia developed. After two years, as a hard tumor developed in the sternum, the cachectic symptoms improved, and finally disappeared. Four years later the rapidly-growing tumor gave rise to such lancinating pains that the patient submitted to the removal of the manubrium sterni. The tumor presented the picture of carcinoma with colloid degeneration. Nine days after the operation a severe tetany developed, which gradually led into cachexia thyroidea. The tumor was a bone metastasis, and not an accessory thyroid. What is interesting is that a metastasis should be capable of assuming a physiological function. The therapy of the case consisted in the eating of thyroids. This method of treatment has been practised by Von Eiselsberg with excellent result in cases of myxœdema. A case of spontaneous myxœdema in a twenty-two-year-old virgin, who was treated in this manner for several months, developed symptoms of poisoning,—symptoms resembling Basedow's disease. In this case, before the treatment was begun, the hair of the scalp began to fall out, and a growth of hair occurred on the face, arms, and breast. After the feeding with thyroids was begun, the growth of hair on the head returned, and the hair in the abnormal places fell out.

The glands are best administered raw in wafers. In the beginning they should be given just before meals, but later on they may be administered an hour or two earlier.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

IV. A Case of Acute Myxœdema. By Dr. SONNENBURG (Berlin). In this case, notwithstanding that a bit of the gland was left after the operation for goitre, acute myxœdema developed. The operation, which consisted in the removal of a large tumor involving especially the left side and compressing the trachea, had to be done during the seventh month of pregnancy, because of the sudden appearance of symptoms of asphyxia. A few weeks after the opera-

tion the characteristic symptoms of cachexia strumipriva appeared. Feeding with sheep's and calves' thyroids (according to Kocher's method) brought the patient through the life-threatening cachexia, and caused a great improvement in her general condition. The discharge of a whitish, creamy, fatless pus, which had been accompanied with no fever, quickly ceased after the treatment was begun.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

HEAD AND NECK.

I. Craniectomy in Microcephalus. By Dr. H. TILLMANN (Leipzig). Lannelongue was the first to recommend craniectomy in microcephalus and other brain-diseases. He operated upon a large number of cases. He has reported twenty-five craniectomies in children, from eight months to twelve years of age, with one death and remarkably good results in the other cases, especially observed in improvement of the intelligence and general condition. These favorable results in microcephalus have not been accomplished by other surgeons who have resorted to craniectomy. The operation consisted usually in the extirpation of a strip of bone about one centimetre broad and ten or twelve centimetres long, parallel with the longitudinal sulcus and about two finger-breadths therefrom, involving the frontal and parietal bones. Many surgeons have made even longer and wider openings than these, involving the frontal, parietal, and occipital bones. Some have divided the skull into two parts by a circular operation, so that the upper segment was movable. The object of craniectomy in microcephalus is to remove the abnormal pressure upon the brain and allow a freer growth of the latter.

Tillmanns regards the operation as of no value in the greatest number of cases of microcephalus, because in most cases the disease represents a congenital misformation of the brain itself which cannot be influenced by the production of defects in the skull. The growth of the brain in cases of microcephalus is usually not hindered by the bones of the skull, but the skull grows too little because the enclosed

brain mass is too small. The sutures and fontanelles are usually present and naturally developed. Only in the rare cases of microcephalus with premature closure of the fontanelles and union of the sutures is craniectomy of value. Here the surgeon may attempt to imitate the function of the sutures by making artificial bony defects at both sides of the longitudinal sulcus in order to favor the growth of the brain and the skull.

Tillmanns has done craniectomy in two cases belonging to this last category. The first was a boy sixteen months old, and at the end of a year is still living, though no improvement worth mentioning has been observed. The other was a girl two and a half years of age, who died suddenly eight and a half weeks after the operation. No improvement was observed as a result of the operation.

The technique recommended by Tillmanns consists in a division of the soft parts at a different level from the bone operation by making a scalp flap. After reflecting back this flap the periosteum is not scraped back, but is removed with the segment of skull, so that the defect shall not become refilled with bone. With a small trepan, about one and five-tenths centimetres in diameter, a hole is made in the parietal bone, from which as a centre the bone-cutter can be introduced and a piece ten or twelve centimetres long and one centimetre wide can be removed parallel with the sulcus longitudinalis, involving also the frontal bone. The dura mater must not be damaged. The scalp is then flapped back into place and sutured. The same operation is performed on the other side.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

II. A New Operative Procedure for the Cure of Bony Ankylosis of the Temporo-Maxillary Joint. By Dr. HELFERICH (Greifswald). Helferich has presented an eight-year-old girl on whom he operated a year before for a left-sided ankylosis of the jaw. The result of the operation is a perfect one, the child being able to open the mouth without any difficulty.

The operation is new in that an interposition of muscular sub-

stance is made between the separated parts of the joint to prevent them from again adhering. After the resection of a pretty good-sized piece of bone with its periosteum, a flap of the temporal muscle about two fingers broad, and representing the whole thickness of the muscle, the attached end being below is turned down, after resection of the processus zygomaticus. This flap is then interposed between the bones, and fixed at its border by a couple of sutures.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

III. Further Observations in the Operation for Cleft Palate. By Dr. JULIUS WOLFF (Berlin). Since the year 1872 Wolff has operated upon 160 cases of cleft palate by staphylorrhaphy. Of these eighty-five were children under six years of age.

Out of thirty-nine cases of children under eighteen months old death resulted in seven cases.

All of thirteen operations in children between one and a half and two and three-quarters years gave good results. Out of these thirteen operations were no deaths, no failures, and no incomplete results.

The remaining 108 cases, among patients ranging from three to fifty-two years, show two deaths. One of these occurred in a child of four years, and the other in one of five, though the fact of the age had nothing to do with the deaths.

The greatest mortality is observed under eighteen months, though these figures are much better than the statistics in general literature. Simon, for example, had two deaths in five operations; and of the three remaining cases one was an entire failure, and two were only partially successful.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

IV. Rhinoplasty from the Arm. By Dr. E. KÜSTER (Marburg). The history of the method of rhinoplasty from the arm, invented by the Sicilian surgeon Antonio Branca, in the fifteenth century, presents many pronounced changes. After being practised

enthusiastically for nearly 200 years, it fell entirely into disuse. It again came into use for a very short time in the present century, and again fell into desuetude, which has lasted eighty years. Küster has been employed during the past three years in reinstating this method. He uses it (1) in obtaining a flap for lining another flap from the forehead in total rhinoplasty, and (2) in repairing the end of the nose. He presented before the surgical congress a nineteen-year-old girl, who had suffered from lupus of the tip of the nose and the septum. The defect was repaired by a flap from the arm. The cosmetic result was eminently satisfactory; the tip of the nose was prominent enough; the septum completely replaced; and the anterior openings well rounded.

Küster recommends, especially in the treatment of lupus of the nose, that the diseased tissue be excised, and the defect repaired by this method. If the flap becomes necrotic, another method can then be used.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

V. Branchial Carcinoma. By Dr. EIGENBRODT (Bonn). Eigenbrodt presented at the German surgical congress a man, sixty-two years of age, who had been operated upon two years before at the clinic in Bonn for a branchial carcinoma of the neck. The man showed no recurrence. This is the longest that any such case has gone without return of this most malignant type of neoplasm. At the operation a considerable length of the vagus nerve was resected. For some time after this there was irregularity and quickening of the pulse. The only disease which the patient had at the time of presentation was the paralysis of one vocal cord. In the scar in the neck was a particular spot which when touched excited an irresistible attack of coughing.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

VI. Cyst of the Ductus Thyreoglossus. By Dr. HAECKEL (Jena). The tumor occurred in an eighteen-year-old girl, and was situated in the middle line of the neck in the region of the hyoid

bone. It had been growing for four years. A physician had incised the cyst, and a fistula remained. The tumor, which was the size of a large walnut, was removed. It was so closely attached to the muscoli geniohyoidei that a part of the muscular tissue had to be removed with the growth. The tumor contained two distinct cavities. The one into which the fistula led was lined with granulations, and presented the appearance of a dilated mucous sac; the other was filled with glairy mucus, and was lined with ciliated epithelium. From its cavity cæcal pouches penetrated the cyst-wall. These were composed of closely-packed thyreoid follicles, surrounded by connective tissue.

The cyst was evidently a cyst of the ductus thyreoglossus (His),—that is, an epithelial passage growing downward from the anterior wall of the throat, and representing the middle portion of the thyreoid gland. From this canal sprouts diverge in the neck from which the thyreoid follicles are formed. The canal itself usually disappears, only its posterior opening being evident, and is represented by the foramen cæcum of the tongue. Anomalies may occur in two directions,—

(1) A portion of the canal may remain patent. A pouch may have its mouth at the foramen cæcum. Cysts at the root of the tongue lined with ciliated epithelium, like ranula, may occur. The cystoma ductus thyreoglossi præhyoideum, ciliated cysts at the apex of the processus pyramidalis, or on the upper border of the isthmus of the thyreoid gland may be formed; or, finally, the processus pyramidalis may remain hollow.

(2) The closing in of the follicles of the thyreoid gland can take place too soon, as a result of which may result struma accessoria baseo-lingulæ in the substance of the tongue; or glandulæ præhyoideæ about the hyoid bone; or, finally, the same between the hyoid bone and thyreoid gland.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

VII. Bony Metastasis in a Case of Thyreoid Tumor.

By Dr. K. MIDDELDORPF (Hanan). Middeldorpf demonstrated drawings and preparations of a case of adenoma of the thyroid which was complicated by metastasis in the lungs and bones. The case was as follows: A fifty-six-year-old woman developed severe pain in the leg, and soon afterwards a swelling was observed a little above the region of the left sacro-iliac synchondrosis. Later, a tumor appeared on the back of the head. Both were regarded as tuberculous in nature till an operation on the head showed that that swelling was a tumor. The microscopic examination showed that the tumor was a metastatic adenoma of the thyroid gland. The primary tumor in the neck was only the size of a pigeon's egg, and before had not been noticed. Later, the patient suffered spontaneous fracture of both humeri and femora, which all healed. She died three years after the first appearance of symptoms. The autopsy showed in the right lobe of the thyroid the primary tumor three and five-tenths to four centimetres in diameter. It had grown into a vein, and thus produced the metastasis. In the lungs were nodules varying in size from that of a pin-head to a hemp-seed. On the occipital region of the skull the bone was perforated by a tumor, eleven centimetres broad, eight centimetres high, and six centimetres thick. The tumor was attached to the dura, and a small tumor thrombus was found in the transverse sinus. The lumbar spinal column was bent towards the right, and to the left was a large tumor-mass involving the whole body of the fourth and part of the third and first. The spinal canal was encroached upon. Metastatic nodules were found in the right wing of the sacrum, on the right tuber ischii, and on the left iliac bone. Nodules were also found on the left femur in the lower part of its neck and in the greater trochanter. The spontaneous fractures of the arm and thigh had consolidated, but within the consolidation-scars were tumor-masses which were sharply differentiated from the dark-red medullary substance. This was a malignant adenoma. The metastatic tumors corresponded exactly in structure with the primary tumor of the thyroid.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

VIII. Calcified Retrosternal Struma. By Dr. W. WAGNER (Königshütte). During the past two years Wagner has had the opportunity of extirpating calcified retrosternal strumas in three cases, which presented very pronounced symptoms, and which were completely cured by the operation. The first case was that of a thirty-two-year-old woman, who had had five children, the last six months before. Until that time she had been well, but during the pregnancy she developed cough, hoarseness, and frequent loss of breath. These troubles were laid before many physicians, and regarded as complications of pregnancy. After a normal labor the trouble still continued and grew worse. Continuous coughing, causing sleepless nights, expectoration, anorexia; continuous loss of flesh and strength led her to the conclusion that she had consumption. Many physicians whom she consulted corroborated her opinion, until finally one found a hard tumor in the right supraclavicular region, and sent the woman to Wagner with the diagnosis of mediastinal tumor. When Wagner saw the patient she was highly emaciated, slightly hoarse, and coughing almost constantly. There was moderate dulness over the right fossa, supra- and infraclavicularis, diminished breathing, and fine râles. In the fossa supraclavicularis a hard tumor could be felt, which seemed to extend to the median line, where it was attached. It could be moved so as to rotate slightly about this point. The patient had observed that when she was a girl the right side of the neck had seemed large, but had given her no trouble, and had gradually become smaller.

The tumor was exposed by excision above the clavicle, and isolated by a blunt dissection. It was found to be hard as stone, and was easily separated from its attachment behind the sternum, and removed with scarcely any loss of blood. The wound was tamponned with iodoform gauze and sutured secondarily. Within twenty-four hours the respiration had greatly improved. The excessive coughing ceased, though some slight hoarseness and cough remained at the end of six weeks, as did a few fine râles and a slight dulness. Tubercle bacilli were found neither before nor after the operation. Several

months later the patient was seen. She was in a state of robust health, and no abnormal physical signs remained.

The second case reported by Wagner was that of a man thirty years old, who was not thoroughly balanced as to his intellect. He had worked at a place some distance from his home and had returned only occasionally. The last time he returned was after an absence of over six months. Then it was observed that he coughed frequently, and had sudden attacks of dyspnoea during his sleep. Of these he did not complain, but they were observed by others. It was also observed that he had two hard nodules in the neck. Examination showed these nodules to be as hard as stone, and the diagnosis was very clear. One large nodule could be felt in the right supraclavicular fossa, and could be easily pushed higher up. The other, which was about the size of a pigeon's egg, was on the left side, and freely movable.

The general condition of the patient was good. Physical examination of the lungs showed nothing especial.

The removal of the two tumors was easily accomplished. The attacks of dyspnoea and coughing ceased, and the patient returned to work a well man.

The third case was that of a man, sixty-three years old, whose physician had made the diagnosis of mediastinal tumor. The patient had had an unusually thick neck for many years, though he had never suffered any inconvenience from it. For about six months, however, he had suffered from cough and occasional attacks of dyspnoea. Soon after these symptoms began he noticed a hard tumor in the right supraclavicular fossa. As the tumor gradually increased in size the symptoms became worse, and hoarseness developed, swallowing became so difficult that he took only fluids. As a result of these things the patient became greatly reduced in flesh and strength.

Examination showed a hard, almost immovable tumor in the right fossa supraclavicularis, which was evidently the upper part of a thoracic tumor, the size of which could not be estimated. Over the upper part of the right lung was moderate dulness, diminished breathing, and strong râles. The respiratory sound was rather sibilant.

The diagnosis in this case was not perfectly clear. It might be that of struma dextra sternalis, or, judging from the size of the patient, the size and immovability of the tumor, an inoperable tumor of some other sort. On exposing the tumor it was found that it could be easily shelled out by sweeping the finger around it. The hæmorrhage was very slight and the wound healed well.

The condition of the patient at once began to improve. He gained in flesh and strength, and felt better than for many years. Breathing and swallowing were especially improved.

The literature and experience of surgeons, especially those who live in regions where goitre is common, go to show that this condition of calcareous degeneration of post-sternal or post-clavicular goitres is very rare. It is rather remarkable that in none of these cases was there an enlargement of the thyroid or any of its lobes. In none of the cases could it be determined how long the tumor had existed. It must be assumed that the growth had existed for years without giving any unpleasant symptoms, until the calcareous degeneration and the sinking of the tumor from increased weight caused the pronounced disturbances of which the patients complained, by pressure on the lung, perhaps on the right bronchus, and on the œsophagus and recurrens, and which were relieved by the removal of the offending mass. Another feature is the firm fixation of the tumor behind the sternum and clavicle, which amounted almost to strangulation, and which would make the diagnosis very difficult for one who had never before met with this condition.

In the last case, only the hard summit of the mass could be felt, which gave no idea of the size of the tumor. The operation in all the cases was very simple, the tumor being shelled out by means of a blunt dissection. The bleeding amounts to very little because such a tumor has ceased to have a blood-supply. The pathological, anatomical condition of the tumors was in all cases the same, so far as the gross examination went. No microscopical examination was made. The dimensions varied from that of a small hen-egg to that of a large walnut.

The walls were composed of a thin connective-tissue sheath and calcareous plates one upon another, reaching a thickness in some places of four millimetres, and which had to be sawed through in order to open the tumor.

The contents were composed of a buttery, chocolate-colored material of more or less firmness of consistence, in which fatty detritus and disintegrated red blood-cells could always be identified. This material also contained an occasional calcareous crumb.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

JAMES P. WARBASSE (Brooklyn).

CHEST.

I. Observations in 118 Cases of Radical Operation for the Cure of Carcinoma of the Breast. By Dr. WILLIAM T. BULL (New York). Of the total number of cases mentioned, thirty have been operated on within three years of the time of the report, and the final result in three others is not known, so that the real number available for calculating the proportion of cures is reduced to seventy-five. Of these three died from the operation; fifty died from recurrence or metastasis; two are still living with recurrence; four died of other diseases after having passed the "three-year limit" without manifestation of cancerous disease; sixteen remain alive and in good health on January 1, 1894. This gives twenty cured cases out of a total of seventy-five, 26.6 per cent., a higher proportion of cures than has previously been reported (Weir, nearly 20; Curtis, 20.7; Dennis, 25 per cent.). Of the living cured cases the average of time now elapsed since the operation has been six years and a few days. Two only have undergone secondary operations. In ten of his earlier operations the breast only was removed; all these died of cancer at the end of an average period of thirty-four and one-half months, three having undergone several secondary operations; in all the remaining cases the breast was excised together with a liberal amount of skin over it, the fascia of the pectoral muscle, and the

glands of the axilla embedded in their fat. Of patients thus operated on, his records show that in twenty-two the breast alone was found to be diseased, and that of these twelve, or about 54 per cent., were cured. Of forty-six cases, in which the glands were involved as well as the breast, eight, or 17 per cent., were cured, while thirty-eight, or 82 per cent., died of the operation, or a recurrence, or are living with recurrence. The author argues from this that patients should be subjected to complete operation in the earliest stages of the disease.—*Medical Record*, August 25, 1894.

GENITO-URINARY ORGANS.

I. On Suprapubic Prostatectomy. By A. W. MAYO-ROBSON, F.R.C.S. (Leeds). The author reports a series of twelve cases in which he has performed suprapubic prostatectomy during the interval including December, 1887, and January, 1894. The ages of the patients ranged from sixty-one to seventy-three years, three of them being of the latter age. Only one death was attributable to the operation; in this case the fatal result was due to suppuration between the bladder and rectum caused by overdistention of the rectum by the colpeurynter. One patient died from senile asthenia some weeks after the operation, having fully recovered from it and having regained the power of voluntary urination by the urethra. The remaining ten were all restored to health, with natural powers of micturition.

With regard to the principles guiding his selection of cases for this operation, he says that whenever a patient has no large amount of residual urine, and can be made comfortable by the passage of a catheter at night, or night and morning, and where catheterism is well borne and not difficult or distressing, operative treatment is unnecessary. In the presence of complete atony of the muscular coat of the bladder, operation is advisable if the atony be only of short duration, say a few weeks; but if the conditions have existed for many months, the removal of the obstruction to the urinary outflow, even if successfully accomplished, can probably lead to very slight

ultimate benefit, but atony of less duration can be overcome by tonics and galvanism when the obstruction is removed.

The presence of a large amount of residual urine associated with fair vesical contractility and not diminishing after regular catheterism, the patient being otherwise in fair health, is a decided indication for prostatectomy, unless the relief given by the catheter is considered adequate by the patient.

Cystitis associated with enlarged prostate, especially if catheterism is difficult and painful, is an indication rather than otherwise for suprapubic prostatectomy, as at the same time the bladder can be thoroughly purified and drained. The presence of a calculus, or of calculous material associated with prostatic enlargement and residual urine, is an indication for suprapubic lithotomy followed by prostatectomy, as at the same time it enables the bladder to be thoroughly cleared, the coexisting cystitis to be treated by drainage, and the obstruction at the neck of the bladder to be removed.

The presence of advanced kidney-disease, especially if associated with a greatly diminished excretion of urea; chronic atony of the bladder; glycosuria; well-marked degeneration of the blood-vessels associated with general senile debility, or other organic disease which would render any major operation inadvisable, would lead the surgeon to seek to give relief by catheterism or simple perineal drainage rather than by a more serious operation.

He adds the following details of his technical methods:

Besides asepticizing the skin by a previous carbolic dressing and washing out the bladder with boracic lotion, he gives the patient five to ten grains of boracic acid and a little saccharine thrice daily for a few days before operation, so as to render the urine aseptic, if possible. The rectal bag, by raising the prostate nearer to the manipulating finger, is of advantage, but it is important not to overdistend it, lest rupture of the rectum or inflammation in the meso-rectum ensue, for which reason he only has four or, at most, six ounces of water introduced. The bladder is distended with boracic lotion until it can be felt above the pubes, no fixed quantity being employed. In two of

his cases the peritoneum was in touch with the pubes, and in one case it was so fixed to it that he had to deliberately open the serous membrane to reach the bladder, after which he carefully separated it and closed the peritoneal opening before incising the bladder, the patient being no worse for the complication.

In removing the obstruction he has found McGill's scissors or the cutting ring forceps invented by Jessop to answer best for the sessile or pedunculated enlargement of the middle lobe, and for the ring-like obstruction he has used the scissors, first at one side and then at the other, so as to cut out a V-shaped portion, making a clear channel from the vesical pouch straight into the urethra, down which the finger is passed to see that the passage is clear.

If the lateral lobes are much enlarged, the finger can be insinuated within the capsule and the adenoid masses can be enucleated with very little difficulty.

Lastly, all loose pieces of tissue are cut away and the parts are left as smooth as possible. In order to disturb as little as possible the cellular surroundings of the bladder, the edges of the vesical opening are fixed temporarily to the margin of the wound by a suture on each side before any intravesical manipulations are commenced.

Suprapubic drainage was efficient in all the cases, and was not necessary to drain through the perineum. In the after-treatment boracic acid was given thrice daily, and the bladder is washed out once or twice daily by syringing a solution of boracic acid through from the urethra to the drainage opening. The drainage-tube was removed, if possible, on the third day, and the patient allowed to sit up within a few days of the operation. As a rule, recovery was attended with very little general disturbance or discomfort, and the urine begins to be passed by the urethra soon after the patient is allowed to sit up.

He considers that the operation of suprapubic prostatectomy in properly-selected cases is one attended with less danger than is usually thought, and that if thoroughly and completely performed it is capable of affording such relief as may be in many instances genuinely termed a cure, and that in a class of cases which, until a few

years ago, were looked on as incurable.—*British Medical Journal*, July 14, 1894.

II. The Surgical Treatment of Surgical Kidney. By Dr. R. F. WEIR (New York). The author reports the case of a man, twenty-five years of age, who, in the course of a gonorrhœal cystitis, developed a suppurative pyelonephritis with threatening general sepsis. Tenderness was most marked in the right loin, and an exploratory nephrotomy on that side was done. The kidney when exposed was found congested and swollen; and incision along its external border about its middle, an inch in length and an inch in depth, disclosed numerous miliary abscesses in the substance of the kidney. The kidney was then extirpated, it being assumed that it was possible that no extensive disease of the left kidney had yet developed. The result justified this assumption, for, after recovering from the shock of the operation, which was severe, the patient made an uninterrupted and rapid recovery, and three weeks later was discharged from the hospital with his urine nearly normal, though not absolutely free yet from pus-cells.

The author then inquires in how large a proportion of cases can such a fortunate limitation to one kidney of serious suppurative disease be expected to be met with; and answers it by showing that out of seventy-one well-defined undoubted acute cases of surgical kidney, the reports of which he had been able to collect from literature, one organ only had been affected in twelve cases,—that is to say, in about 20 per cent. of the total number. He concludes, therefore, that it is justifiable, if the patient's general condition shall warrant it, in a case of acute septic invasion of the kidneys to make on one or both sides an exploratory incision, not only in the hope of relieving the acute interstitial invasion, but also of perhaps encountering a larger and well-defined focus of pus, which pathological condition cannot always be readily discriminated from the more dangerous lesions of the veritable surgical kidney. Should the symptoms point to one kidney only, or should a double exploratory incision show the same

result, a nephrectomy may with some hope be resorted to.—*Medical Record*, September 15, 1894.

III. Cases of Excision of Considerable Portions of the Urinary Bladder.

By Dr. R. F. WEIR (New York). The author relates three cases in which he has removed considerable portions of the urinary bladder for the extirpation of neoplasms of its wall. In the first case, a man fifty-nine years of age, the cystoscope had revealed a tumor on the posterior wall. The rectum was distended by a colpeurynter and suprapubic section was done, the patient being in the Trendelenburg position. A single tumor, the size of the distal phalanx of the thumb, was found on the upper part of the posterior wall, somewhat to the right of the median line. To effectually get beyond it, the peritoneum was stripped off from the summit and the posterior surface for a space reaching from one seminal vesicle to the other and down nearly to the prostate. In so doing, at one point a rent was made in the peritoneum, which was at once sewn up with silk sutures and caused no after inconvenience. A triangular portion of the posterior wall of the bladder, about two and a half inches on each of its sides, including the tumor, but going widely from its base, was finally removed. Proper suture of the lower angle of this incision was found impracticable, and so no attempt to close any portion of it was made, but the space between the bladder and the peritoneum was packed with iodoform gauze, and the bladder itself was filled with iodoform gauze packed around a rubber catheter passed to the bottom of the organ. The patient did well. His wound had very nearly closed, when he was attacked by erysipelas, which, after four days, terminated in death, seven weeks after the operation. At the autopsy it was seen that the suprapubic wound had very nearly healed, the gap in the posterior wall of the bladder had closed over by a smooth cicatricial surface.

The second case, a man fifty-five years of age, was the subject of a carcinoma of the summit of the bladder, which also involved the overlying soft parts in the suprapubic region, presenting superfi-

cially above the pubis as a tumor of the skin about the size of an English walnut, with an indurated area surrounding its base about two inches in diameter. The cystoscope revealed a tumor projecting into the bladder on its postero-superior wall. Enlarged superficial inguinal glands existed on both sides. The external growth was circumscribed by incision, and separated from the surrounding soft tissues down to its attachment to the bladder. The peritoneum was then peeled off by a blunt dissector from the posterior wall of the bladder down to the prostate, and on each side as far as to the seminal vesicles. This whole exposed portion of the bladder was then excised, including a papillomatous growth in its centre, as well as the growth rising out from the summit of the bladder, the section through the bladder walls passing at least from one-half to three-quarters of an inch beyond the growth in all directions. The bladder was sewn up without difficulty from the bottom with interrupted catgut sutures, passed through all its coats; in one or two places on its summit these were reinforced by silkworm-gut sutures, only through the muscular coat. A small opening was left towards the pubis, through which a double rubber drain-tube was inserted. The wound in the abdominal wall was packed with iodoform gauze. The patient did well after the operation, leaving the hospital eight weeks later, all healed, holding his water from three to four hours. The capacity of the bladder was from four to five ounces. Two weeks after the operation on the bladder, the glands in each groin were also extirpated.—*Medical Record*, August 11, 1894.

BONES—JOINTS.

Reduction of Dislocation of Humerus complicated by Fracture of the Surgical Neck. By C. B. PORTER (Boston).

At the meeting of the Massachusetts Medical Society, held June 12, 1894, Dr. Porter exhibited a patient who had sustained a sub-coracoid dislocation of the humerus, together with a fracture of the surgical neck. Fifteen days after the accident the case was submitted to the following operation:

The shoulder-joint was approached through a U-shaped incision through the deltoid muscle. The head of the bone was found out of the glenoid cavity. A drill-hole in the anterior surface of the head of the humerus was made allowing a blunt steel hook to be inserted into the bone. Traction was made by the hook outward, aided by pressure of the thumb, this reduced the head of the humerus into the glenoid cavity. The wound was closed in the soft parts, a sterile dressing applied, and the arm held fixed by a plaster-of-Paris dressing around the chest and shoulder. In five weeks the apparatus was removed in the daytime, and worn a short time longer at night only. Union was firm in five weeks.

Eight months after the operation: The motion in the dislocated shoulder is about perfect; the arm, the patient reports, is as useful as it was before the operation.—*Boston Medical and Surgical Journal*, June 28, 1894.

II. The Histological Consideration of Osteoplasty.

By Dr. BARTH (Marburg). These present considerations are a continuation of the author's observations published last year, and are based upon sixty-five experiments in osteoplastic operations performed upon animals. These experiments have confirmed the former opinion that detached fragments of bone never retain their vitality when transplanted, but perish, and are substituted by new bone formation. It is therefore of no consequence whether the transplanted bone is from another species of animal or not. It becomes devitalized, and then the new bone forms in its place. Ollier's differentiation between autoplasty, homoplasty, and heteroplasty is therefore without significance, for the method of healing is really the same in all cases. The dead fragment of bone is nothing more than an aseptic porous foreign body, and in the healing it conforms precisely to the laws which govern such. It becomes enveloped and penetrated by young, vascular connective tissue springing from the periosteum and marrow of the surrounding bone, and is thus completely infiltrated with the new tissue-cells. On account of the origin of this tissue from periosteum

and marrow, it is capable of producing bone, and about the end of the first week a layer of bone begins to be deposited on the outer surface, and somewhat later new bone is formed in the old Haversian canals and medullary spaces. By such a continuous deposit of new bone, in the course of months the dead bone becomes entirely replaced by the living. This new deposit is not equally distributed throughout the dead bone. It seems to be more active in the deeper parts of the wound defect than at the surface where the regeneration and deposit of the periosteum seems to encounter some difficulties. On the other hand, resorption seems to take place at some parts, which results not only in a removal of the old but also of the new bone. A sort of rarefaction results, which can be seen with the naked eye. After the process of substitution is completed, the borders of the defect cannot be discovered even microscopically. In the skull the new bone can be macroscopically identified by the flattening of that portion of the bone, and in the cylindrical bones by the porous appearance of the compacta due to widening of the vascular spaces around which the new bone is deposited. In the marrow-bones the new bone-formation begins from the marrow.

The retention of the periosteum upon the surface of the implanted bone has no influence whatever upon the after-course of the healing. On the other hand, the case is a very different one when the periosteum is connected by a sufficient pedicle to the living tissue, as in the osteoplastic skull resection after the Wolff-Wagner method. Here the larger part of the bone retains its vitality, and only in the border of the cut surfaces is found the non-nucleated and necrotic bone-substance. In wounds of the bone the conditions are similar to those after implantation of completely separated pieces, and healing takes place in the same manner. The fragment becomes united to the wounded edges of the bone by a bony callus, and the dead bone becomes gradually replaced by successive layers of new bone deposited about the vascular spaces of the necrotic piece.

The preparations in two cases in which a thin periosteal bone-flap healed, not in the bone wound, but with the bony surface

beneath the skin, showed a very different course. The process of healing in this case should be studied like that of the flaps of skin, periosteum, and bone of König, or the periosteum and bone-flaps of Wolff. The thin plate of bone perishes completely, but such an active reproduction of bone takes place from the periosteum that it is soon doubled in amount. This growth depends upon the osteogenetic layer of the periosteum, which is destroyed by tearing the latter from the bone.

Just as can be done with fresh fragments of bone, dead fragments and other foreign substances can be used to repair a bony defect. It simply requires that a sufficient irritation be caused by the implanted material to excite the formation of the young ossific connective tissue. Defects in the skull can thus be repaired by filling them with macerated pieces of bone. This dead substance becomes quickly permeated by the young tissue, in which new bone is deposited, just as occurs in the transplantation of living bone. The histological observations of Bidder have shown that the same thing occurs when ivory is employed.

The most difficult substance with which to repair such a defect seems to be decalcified bone. It is absorbed so quickly by the growth of young connective tissue that nothing but a mass of ordinary scar-tissue results.

The implanted material must have a certain amount of resistance in order to give rise to bony substitution. It is also important that the foreign body fills the defect as completely as possible. When this is not accomplished, usually nothing but an encapsulation of connective tissue results.

A material which fulfils these indications is sponge. Barth has reported a number of cases of bony defects which he has filled with sponge, sutured the skin over the surface, and obtained the desired result. The sponge is quickly penetrated by a growth of connective tissue, and in a short time the defect is closed with an organic deposit level with the surrounding bone. After three weeks an ossification proceeds from the circumference inward.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

III. Dry Necrosis of Bone: Its Importance and Prevention. By Dr. LESER (Halle). Dry necrosis of bone occurs often as an *a priori* condition. It is especially observed in open fractures, which progress without reaction. The exposed bone does not become covered with granulations, but lies dead and white in the open wound. König has called attention to this in his work on general surgery, and says that this uncovered portion of bone has to be finally resected, but that a longitudinal section through the resected piece of bone shows no sign of difference between normal and abnormal bone. An especially severe case of such necrosis in a direct compound fracture of the leg was seen by Leser sixteen weeks after the accident. It induced him to try some experiments upon animals with the view of discovering more accurately the nature of the lesion. He found that under an aseptic course dry necrosis could be made to occur in the fractured ends of bones when stripped of their periosteum. He caused such artificial necroses in the ends of the fragments of large bones of the extremity, and found that the dry necrosis could assume much greater dimensions than had been supposed, and that there was an absence of any sign of inflammatory demarcation or formation of callus. All of the cases were carefully dressed, so that the bared surface of bone was kept moist, and by this practice the danger of necrosis was diminished.

The necrotic reactionless end of the fractured bone is observed lying in the wound. For as long as three months it remains, but is a superficial condition, involving but a few millimetres of the outer surface, though presenting an appearance of necrosis of the whole end of the fragment. This shell surrounds the end of the bone like a cap. When this is chiselled through, healthy callus-producing bone is exposed. It is not safe in these cases to wait for the exfoliation of this shell; it should be chiselled away, if the most rapid cure would be effected, and the danger of pseudo-arthritis be averted.→*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

IV. Observations upon Osteomyelitis Non-purulentia (Sero-Mucinosi). By Dr. F. GRIMM (Berlin). During a service of five years in a Japanese hospital at Yezo, the author observed twenty-two cases of osteomyelitis acuta. Besides these, one case of pronounced periostitis aluminosa or osteomyelitis non-purulentia (Schlanger) was encountered.

A twelve-year-old boy developed the symptoms of osteomyelitis of the left femur after a traumatism. After using the limb for a short time, it became worse, and after several weeks he was brought to the hospital.

On opening a large, deep abscess of the left thigh, a clear, yellowish-green, tenacious fluid escaped,—about 600 cubic centimetres. A stump of the diaphysis of the femur, about the length of a thumb, projected into the cavity. It was partially covered with fresh granulations, as was the wall of the abscess. The evacuated fluid contained but few corpuscular elements, and culture experiments upon artificial media were negative.

The diseased leg was five centimetres shortened. A firm involucrum formed—and the sequestrectomy was performed in the usual manner.

Not all of the cases reported as periostitis aluminosa belong to the class of osteomyelitic diseases. It is best to classify the cases of this unusual termination of inflammations in sero-mucinous abscesses according to their origin. They may occur in tuberculous abscesses or in gummatous processes. Collections of sero-mucinous fluid occur under favorable circumstances upon granulating surfaces, as under dry scabs, etc. So it is not surprising that this condition is found sometimes in cavities which are lined with granulations. The lymph serum is alone absorbed, but mucin, which is composed of degenerated tissue, continues to collect, as it is absorbed with great difficulty. In a pure lymphadenoma cysticum originating from the sacrum and forming a prominent tumor over the trochanter, lymph serum and mucin together were found. A case reported by Ollier yielded a thick, slimy fluid at the first puncture, and later a thin serous fluid

was evacuated.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

V. Experimental Studies in the Transplantation of the Intermediary Cartilage. By Dr. HELFERICH (Greifswald). The observer has demonstrated by a variety of preparations that the transplantation or replantation of the intermediary cartilage from the ulna of the rabbit is possible without destroying the longitudinal growth of the bone. The microscopic examination also corroborates the conclusion.

In a large number of experiments (131 in all), a pronounced curving of the leg operated upon was observed to take place. This is the result of a broad union of the ulna at its seat of operation with the radius,—in fact, a union of the epiphysis of the ulna with the diaphysis of the radius.

It was especially observed that there was often a compensating lengthening of the epiphysis, probably as a result of the apposition on the sides of the joint cartilages.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

JAMES P. WARBASE (Brooklyn).

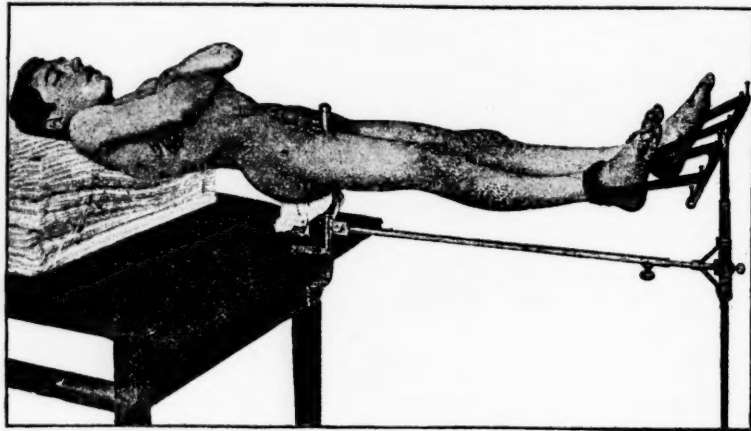
VI. Extension Apparatus for the Application of Plaster Bandages to the Lower Extremities and to the Pelvis. By Dr. P. BRUNS (Tübingen). The extension apparatus used for this purpose at the surgical clinic at Tübingen was first devised and described by V. Bruns some years ago. The original device has been modified and improved upon by the present professor of surgery there, P. Bruns, and is described by him as follows:

As can be seen from the illustration the apparatus consists essentially of two parts: a pelvic support which supplies counter-extension by pressure upon the perineum, and a movable rake-like attachment to which leather straps encircling the ankles are attached, thus securing extension of both legs. The sides and back of the buttocks, and the entire surface of the lower extremities are thus left free on all sides, and the bandage can be most conveniently applied. Extension

can be made at will upon either side till the two legs are as nearly of equal length as the circumstances will allow. The control of this extension is rendered easier by the fact that the body is quite straight, and the legs are in exactly the same relative position.

Lightness and ease of transportation are secured by the use of iron tubing, which can be easily separated into the four pieces which compose the apparatus.

Its most frequent use is in the application of plaster bandages in cases of coxitis, especially where contractures exist which must be overcome, and bandages applied during narcosis. In fractures of the



femur, accompanied by shortening or angulation, requiring the use of extension during the application of the plaster bandages, the apparatus is highly recommended. Bruns uses it, too, for the securing of exact straightness after osteotomy on one or both sides for the correction of genu valgum, and then applies the plaster.

The advantages secured by the use of such an apparatus are at once apparent. It can be screwed fast to any table by the use of a clamp. Since the lower extremities and the pelvis are completely exposed on all sides, the plaster bandages can be readily applied from the ankle to the navel. The patient is securely and comfortably held in position without any further help, and the operator is thus able, if

necessary, to dispense entirely with assistants. Most important of all is the fact that uniform extension can be applied continuously, and can be maintained until the plaster is quite hard, thus avoiding the cracking and breaking of the dressing which often occurs. The shortening and angulation which may exist can be overcome, and then the corrected position carefully watched during the application of the bandages; much more reliable extension is thus secured than when the force is applied by the hands of an assistant, who can never make exactly uniform tension during the entire time that is necessary.

The apparatus has been frequently used, and time has confirmed the value of the advantages which are claimed for it.—*Beiträge zur klinische Chirurgie*, Bd. XII, Heft 1, 1894.

H. P. DE FOREST (Brooklyn).

BOOK REVIEW.

TRANSACTIONS OF THE AMERICAN SURGICAL ASSOCIATION. Volume XII. 1894. Edited by DE FOREST WILLARD, M.D., Recorder of the Association.

The volumes of Transactions of the American Surgical Association already begin to form an important part of the library of every American surgeon, as each succeeding year adds to their number and importance. The President for the current year, Dr. J. Ewing Mears, takes occasion to analyze the contents of the first ten volumes. From this analysis we find that the larger number of papers have been devoted to the surgery of the brain, kidney, bladder, and intestine. The bacteriology of surgical diseases has received treatment in only four papers. The natural inference from this is that the membership of this Association is made up largely of the senior surgeons of the country, whose attention and work must in the nature of the case be devoted especially to the more practical aspects of surgery; also that in the hospitals and clinics of this country experimental laboratory work has hitherto not attained the development which it deserves, and which it is sure to have.

The present volume contains twenty papers, four of which are somewhat exhaustive reviews of the subjects treated, and were prepared by their authors at the request of the Business Committee of the Association. These are upon The Surgical Treatment of Empyema, by Dr. John Ashhurst, Jr.; Methods of Teaching Surgery, by Dr. John S. Billings; The Surgery of the Kidneys, by Dr. Louis M. L. Tiffany; and The Surgery of the Ureter, by Dr. C. Fenger. The reader will find the discussions provoked by each of these papers to be of much interest. The remaining papers of the volume are less formal, but by no means less valuable. The volume as a whole is a most valuable and important contribution to surgery.

L. S. PILCHER.

OPERATIVE PROCEDURES IN CONGENITAL AND
TRAUMATIC DISLOCATIONS OF THE
HIP IN CHILDREN.¹

By V. P. GIBNEY, M.D.,

OF NEW YORK,

SURGEON-IN-CHIEF TO THE HOSPITAL FOR THE RUPTURED AND CRIPPLED.

THIS paper is based upon the results in nine cases of operation for dislocation of the hip in children, five of which were performed for the relief of congenital dislocation. The remaining four presented the same deformity, but in all of these, with one exception, the head of the bone had been destroyed by previous acute inflammatory process. It has occurred to me that an analysis of these cases with the salient points in their history brought out in moderate detail would prove sufficiently interesting to serve as a study.

During the last five or six years wonderful advance has been made in the treatment of congenital dislocation of the hip, but the results in this country have not been as good as those reported from the clinics of Hoffa and Lorenz. The operation first proposed and executed by Hoffa has been improved (?) upon by Lorenz, of Vienna, and still later by Bradford, of Boston. It seems that we must admit that a proper selection of cases has not been made. The temptation to operate upon children beyond the proper age is so great that one can hardly resist. The reasons given by Hoffa are adequate enough, and these become very apparent when one attempts the operation. It is claimed by this surgeon that, in young children under four years of age, the muscles and tendons can be stretched a good deal by manual force, and that the head of the bone can be quite easily brought

¹ Read before the New York Surgical Society, October 10, 1894.

down into the old position. A knowledge of the deeper structures about the hip-joint, which structures include ligaments of varying density, tendons, and muscles, together with a dense tissue filling the acetabulum, would seem to impress the surgeon with the difficulties attending a successful operation. In a paper presented by Dr. Bradford at the last meeting of the American Orthopædic Association, greater importance was given to the Y ligament. This gentleman demonstrated how easy it was to divide this ligament in the anterior incision of Lorenz, and it is believed that many of the difficulties will be overcome in older cases.

By way of illustration, the following cases are given in detail :

CASE I. *Traumatic; Operation with Good Immediate Result a Few Weeks Later; Relapse within Two Months; Second Operation; Paralysis of the Thigh Muscles; Good Recovery.*—A male, eight years of age, was admitted May 5, 1893. In November, 1892, he met with an accident. His left hip was dislocated. Was taken to Mount Sinai Hospital a few weeks afterwards, and a successful operation performed. The head of the bone slipped out of place again, about two months after the operation, and at this time the muscles of the thigh and foot were found almost completely palsied. There were one and a half inches shortening as measured from the anterior superior spinous processes, one and a half inches from the umbilicus. The thigh was one inch smaller than its fellow. The trochanter was far above Nélaton's line.

Through the extensive cicatrices of the former operation an incision was made May 19. Head found on the dorsum. The acetabulum was filled with granular and fibrinous tissue, which was removed with a sharp spoon. Acetabulum much enlarged, adductors divided, tensor vaginae femoris divided, then by great force the head of the bone was placed in the acetabulum thus prepared. The capsule was united by a kangaroo tendon, superficial wound was nearly closed with catgut, the lower portion being left open for drainage. Limb was put up in 20° abduction, plaster of Paris as a fixed dressing.

The suppuration continued throughout the spring and well into the summer. By October 1 all sinuses were closed. The limb was in good position; no shortening. From that time to the present the

treatment has been directed to his paralyzed muscles, most of which have recovered. He still has a little foot-drop.

This case has been presented at the Surgical Section of the Academy of Medicine, and has also been before this Society prior to the second operation, and my only apology for presenting it now is as a supplement to the other cases. He presents now little or no shortening, a fair range of motion, a pretty firm cicatrix about the head of the femur, which prevents its slipping out of place. There is a little drop-toe due to paralysis of the anterior tibials.

Examination now, October 10, shows limbs equal in length both from the anterior superior spinous process and from the umbilicus. Thighs equal in size, the knee nearly one-half inch larger than the right, the calf three-quarters of an inch smaller. The angle of greatest extension is 165° . Hip is pretty stiff. Drop foot left side. The trochanter major is below Nélaton's line. He is fitted with a brace to correct his drop foot. There is no paralysis of the thigh muscles.

CASE II. *Traumatic; Hoffa's Operation; Impossible to Reduce; Half of the Head Excised, the Remainder Replaced in the Acetabulum; Prolonged Suppuration; Good Final Result.*—Male, eight years of age, was admitted April 14, 1894. In November, 1893, a larger boy fell upon him and broke his thigh near the hip, so reported. The report was also that his patella had been fractured. A surgeon put the parts in plaster of Paris. He remained two months, recovering from the fractured patella, but the hip was found to be dislocated on the dorsum. His general condition on admission was good, but he stood bearing his weight on the toe and ball of the foot, the foot rotated outward, the thigh in adduction. The tip of the trochanter was one and a half inches above Nélaton's line. The adduction was so great that the thigh lay across its fellow just above the knee. The measurements from the anterior superior spinous processes showed three-quarters of an inch shortening; from the umbilicus, three-quarters of an inch. Flexion was limited to 90° , extension to 165° .

A small curved incision was made April 18 over the head and trochanter, the capsule exposed, and an attempt was made to reduce the deformity. This was unsuccessful even after the acetabulum had been cleaned of all foreign material, after the adductors had been divided and a large portion of the capsule cut away. Finally, half of the head was excised, and it was not until this was done that the remaining portion of the head could be replaced. An attempt was

made to close primarily, but suppuration followed. The efforts at reduction, the various assistants called upon to assist in getting the head into place caused, I am sure, infection, and to this suppuration was undoubtedly due.

It was necessary after a few days to make a counter opening. One or two abscesses formed, but all the while the good position of the limb was maintained. On August 1 there was one-half inch shortening. By the use of a long Thomas splint, with a firm bandage about the hip, this shortening was reduced, so that by September 10 the limbs were equal in length.

At the last examination, which was on September 10, there was a very fair range of motion. One sinus remained open, requiring to be dressed once or twice a week. The hip was firm. With a great deal of force the head of the bone could not be thrown out. It was deemed prudent to continue the apparatus, but his parents fancied that the result was not good, and the father, while under the influence of liquor, removed the boy, and I am unable to show him this evening.

CASE III. *Congenital; Hoffa's Operation; Reduction very Difficult; Prolonged Suppuration; Good Result; a Sinus Remaining.*—Female, nine years of age, was admitted to the hospital February 23, 1894. She had been under observation in the Out-Patient Department since she began to walk, when the deformity was first discovered. The left hip was the one involved, and the patient had been subjected to the usual expectant treatment,—viz., a high shoe, sometimes a spica bandage. At the time of her admission her general condition was very good, but she bore her weight on the right limb. There was apparently two inches shortening. The trochanter major was very prominent; the ilio-femoral crease well marked. The movements were all good except in abduction. The head of the femur could be distinctly felt on the dorsum ilii. The tip of the trochanter was an inch above Nélaton's line. The comparative measurements were as follows: From the anterior superior spinous process to the lower border of the internal malleolus, right side, 25 inches; left side, 23; from the umbilicus to the malleolus, right side, 26½; left side, 25; circumference of the right thigh, 12½; left thigh, 10½; right knee, 9½; left knee, 9; right calf, 9; left calf, 8½. Her gait was very awkward, but comparatively easy.

On March 6 the usual posterior incision of Hoffa was made, the capsule soon exposed, this incised when the head, neck, and trochanter were exposed. The muscles around the base of the trochanter

major and the trochanter minor were divided, and attempt made to do this as nearly subperiosteally as possible, the adductors of the thigh divided, some points of the tensor vaginæ femoris and of the fascia lata also divided. With a sharp spoon the shallow acetabulum was deepened, care being taken to preserve the rim in the upper portion. It required a great deal of scraping and shaping to get the acetabulum large enough for the head, which was finally, with considerable force, replaced. The capsule was sewn together with silkworm gut, and the wound packed with iodoform gauze. The child was put in the wood cuirass which Hoffa uses, and is known as the Phelps wood bed.

Two days later her temperature was 104° F. She did not seem to be suffering much, but the wound was dressed, and the dressing was continued daily until April 13, when she was taken from the wood bed, and a plaster-of-Paris bandage applied. Her temperature ranged from 101° to 105° F. from March 6 to May 12. On April 19 she was placed in a wheeled chair, but the discharge from the wounds was very profuse. Some counter-openings had been made, and the drainage was very good. The good position of the limb was maintained all the while by traction.

On May 24 the limbs were equal in length, the discharge was light, and plaster was removed and a long hip-splint applied, the stem being especially long so as to favor abduction. It was noted on June 11 that she had been going around on the splint, but walking very poorly. Sinuses were very nearly healed. The limbs still equal in length. July 19 the wound was healed, she was walking better, complained of some pain on pressure about the hip. The abduction was still maintained by means of the splint. She had improved in health. On July 26 was discharged, wearing the splint with a three-inch high shoe on the sound foot. The measurements were still the same.

September 27 the measurements from the anterior superior spinous processes were exactly the same. From the umbilicus the left limb lacked one-quarter of an inch of being as long as the right. The tip of the trochanter was below Nélaton's line. For the last two or three nights she had complained of much pain, and there was decided fulness to the outer side and above Scarpa's space. An open sinus was found, which led to bare bone. She walked very well; limb was still well abducted. The sinus was tented, bichloride fomentations employed, and two or three days later she was very much improved.

At the time of this examination there was no slipping up or down, and the structures about the hip seemed firm. I propose to leave off the hip-splint in the course of a few weeks after the closure of the sinus.

CASE IV. *Congenital; Hoffa's Operation; Immediate Result Good; Relapse; Readmitted for Further Treatment.*—Male, aged seven and a half, admitted November 10, 1893. Family history good; had had no treatment; began to show the deformity when he first walked. His gait on admission was quite pronounced; favored the left side. There were apparently two inches shortening. Abduction was very markedly limited. Adduction easily made. Extension and flexion good. The trochanter was two inches above Nélaton's line. Head of the femur could be easily recognized on the dorsum ilii. Comparative measurements: From the anterior superior spinous process, right side, 23 inches; left side, $21\frac{1}{2}$; from the umbilicus, right side, $26\frac{1}{4}$; left side, $25\frac{1}{4}$; right thigh, $11\frac{1}{2}$; left thigh, 10; right knee, $9\frac{1}{2}$; left knee, $8\frac{1}{2}$; right calf, $8\frac{1}{2}$; left calf, 8.

The Hoffa operation was performed, November 17, under great difficulty, but the head was finally replaced in the prepared acetabulum. Plaster of Paris was applied with limb in abduction and outward rotation. Wound was left open and packed with gauze.

The wound followed the usual course. There was very little supuration and very little reaction. By January 13 the hip was in good condition, one-half inch real shortening, no practical shortening. Head of bone seemed firmly anchored. Long splint applied, but he was still confined to bed. On January 27 a short plaster-of-Paris spica bandage was applied, and he was allowed up on crutches. On February 23 there was no further shortening, though he had little confidence in walking.

From March 6 to 31 he had diphtheria, and was treated in the Willard Parker Hospital. On his return there was no real shortening, but one-half inch practical shortening,—that is, as measured from the umbilicus. He was to have passive motion every morning, use his crutches, and wear very little support about his hip. The wounds had long since healed.

April 25 it was noted that he was gaining more motion in hip, was walking around with the crutches. On May 23 there was one inch real shortening, one and a half inches practical shortening. He was put to bed, and traction made for a while until an apparatus could

be constructed, which was a combination of the Knight spinal brace and the Thomas hip-splint, with a plain hinge-joint at the hip. July 2 his angle of greatest extension was 145° . Considerable adduction. Trochanter was above Nélaton's line.

He was taken home shortly after this, but on tracing the case, October 1, I found that there was three-quarters of an inch real shortening, one and a quarter inches practical shortening. The angle of greatest extension was 150° . Very little motion. The tip of the trochanter was one inch above Nélaton's line. The expanded portion of the neck could be felt above the trochanter, and made an examination a little difficult. He walked like one with deformity from old hip-disease.

He was put on inclined plane with weight and pulley, and to-day his deformity is not quite as great, but he still has three-quarters of an inch shortening as measured from the anterior superior spines, and one inch as measured from the umbilicus. There is a small range of motion. It is proposed to make very firm traction on inclined plane, and in this way drag the head of the bone down into position, after which a firm support will be worn for many months. It is difficult to give a prognosis.

CASE V. *Flail-Joint from Acute Arthritis; Exploratory Incision; End of Femur secured to Acetabulum by Kangaroo Tendon; Good Result.*—Male, eight years of age, admitted November 13, 1893. In 1890 he had an abscess about the right hip immediately after an attack of pneumonia. The abscess opened spontaneously, and was treated at the Roosevelt Hospital clinic. On admission his general health was good, but he bore his weight, as he walked, on a dislocated limb. The end of the femur could be seen distinctly forcing upward the gluteal muscles, and as he would bear his weight on the other limb, the deformity would in a measure disappear. The rather sharpened end of the femur could be distinctly felt without any head whatever attached. The comparative measurements: From the anterior superior spinous process, right side, $18\frac{1}{2}$ inches; left side, $21\frac{1}{2}$; from the umbilicus, right side, 21; left side, 23; right thigh, $9\frac{1}{2}$; left thigh, 11; right knee, 8; left, 9; right calf, 7; left calf, 7.

A posterior incision was made November 28, and extended down upon the end of the femur, which was found devoid of head or neck. Simply the tip of the trochanter presented, covered by some dense fibrous tissues. On seeking for the acetabulum, I found an exostosis

filling the acetabulum, or at least, where this cavity should exist, and with a chisel removed this growth of bone, made a depression triangular in shape. The end of the femur was denuded of periosteum, and a triangular-shaped area made to correspond with that on the ilium. These two surfaces were approximated, one or two strong pieces of kangaroo tendon were passed through holes which were drilled in the two bones, and the parts were securely tied together. The wound was closed without drainage, but additional precautions were taken to pass some steel nails through the femur and ilium until the parts seemed quite firm. A full dressing was applied. Limb put up in plaster of Paris, and primary union took place.

He had no temperature worthy of record, suffered little or no inconvenience, and on January 9, 1894, the steel nails were taken out, the puncture wounds curetted, and simple dressing applied. At this time union was good. On February 2, the plaster of Paris having been continued, there was very slight motion at the hip. The comparative measurements at this time were, right side, 20 inches; left side, $21\frac{1}{2}$, as measured from the anterior superior spines; from the umbilicus, right side, $23\frac{1}{2}$; left, $24\frac{1}{2}$. There was, thus, less than one inch practical shortening. February 14 the plaster was removed. There was found an arc of motion of 15° . At this time a small point at one end of the wound threatened to open, and the kangaroo tendon was found, which was removed, and was in very good condition.

On March 27 a long spring with pelvic band and peroneal strap was applied. He has been walking with this up to the present date, and presents, October 9, the following measurements: From the anterior superior spine, right side, $20\frac{1}{2}$ inches; left side, $22\frac{1}{2}$; from the umbilicus, right side, 23; left side, $25\frac{1}{2}$. He can bear his weight on the limb without the bone slipping up as it did when he was first admitted. Parts seem quite firm, yet I dare not omit the apparatus, and have provided him with a high shoe, one and three-quarters inches, and a jointed splint with hinge-motion at hip.

This case was presented at the Surgical Section of the Academy of Medicine last winter.

CASE VI. *Congenital; Hoffa's Operation; Primary Union; Immediate Result Excellent; Relapse; Failure to maintain Limb in Position by Apparatus; Death from Diphtheria.*—Male, five years of age, admitted October 24, 1892. The history was that he began to show this deformity when he was two years of age, at the time he walked. On admission there were one and a half inches apparent

shortening of the left limb. The head of the bone could be felt. Abduction was resisted. Comparative measurements: Right side, from the anterior superior spine, 19 inches; left side, 18; from the umbilicus, right, 21; left, 20; right thigh, 12; left thigh, 11; right knee, $8\frac{3}{4}$; left knee, $8\frac{1}{2}$; calves same size.

Operation made October 28. Wound closed throughout with catgut.

On November it was noted that he had had one or two days of temperature rather high, but all along had been in good condition. On November 18, plaster of Paris removed. Wound united throughout. Head of femur remains in acetabulum. Limbs of same length. He was put to bed after the reapplication of plaster of Paris. On December 2, plaster of Paris was removed. Limb was found to be a quarter of an inch shorter than its fellow. Motions in all directions were good and painless. On December 14, there was a fair range of voluntary motion. Hip-splint was worn, the shortening at this time having reached one inch, and the head of the bone could be pushed out of the acetabulum with very little force.

From this time forward an attempt was made to hold the head of the bone in place by apparatus, which was partially successful, but on March 1 it still required firm pressure to maintain the position of the head. He developed diphtheria shortly afterwards and died April 17. An autopsy was made by Drs. Townsend and Whitman, fourteen hours after death, at the dead-house of the Willard Parker Hospital. Their report is as follows:

Autopsy.—Rigor mortis slightly marked. General condition of the boy fair. Lying on his back, his left leg was markedly rotated outward, limbs parallel. It was evident that the left was the shorter of the two. All movements at hip free. Right anterior, $19\frac{1}{4}$ inches; left anterior, $18\frac{5}{8}$; right ulna, $21\frac{1}{2}$; left ulna, 21. Trochanter one-half inch above Nélaton's line. A curved incision was made over and above the hip-joint, freely exposing all the parts. The head of the bone was found to be dislocated forward, and the head resting in a socket below the anterior superior spine of the ilium, and held in place by firm adhesions in front, in the line of the original incision at the operation done at hospital. This new facet was about the size of a five-cent piece and was about half-way between the inferior and superior spines. The head of the bone was flattened, the cartilage on its inner edge, where it articulated with the new facet, was eroded, the head was flattened, both laterally and from before

backward. The angle of the neck was depressed, and it made about a right angle. There was no sign of an acetabulum, where the normal acetabulum should be, and the portion that had been scooped out at the time of the operation was filled up with solid tissue which seemed to be partly bone and partly cartilage. With the head attached to the bone at the angle that the neck was found to make, it was clearly evident at the time of the autopsy that any attempt at reduction—that is, complete and perfect reduction into a normal acetabulum—would have been attended by a complete rolling in of the femur, and consequently of the leg, so that a subsequent osteotomy would really have been necessary. The portion of thickened tissue which filled what should have been the acetabular cavity was over one-half inch in thickness. Efforts at traction with the limb in the new acetabulum proved that the rim of the pelvis, which was above it, and on which was located the anterior superior spine, was an effectual bar to the slipping up of the bone in walking, and that although the limb was not in the new acetabulum as expected, for practical purposes the newly-formed joint was more useful than a poorly-formed one on the dorsum of the ilium; that although there was some slight motion upward, it was not equal in any sense of the word to what it was in the old and imperfectly formed acetabulum.

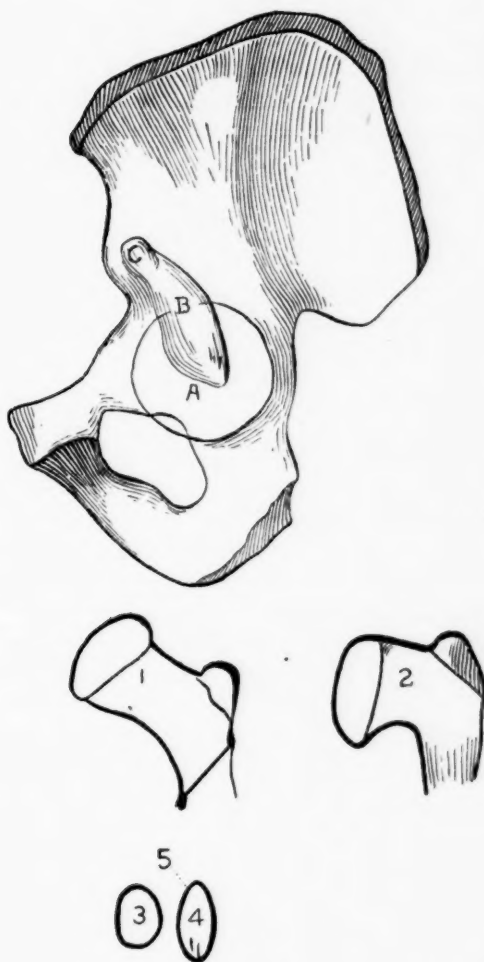
The patient had died from diphtheria and broncho-pneumonia. An intubation had been done some hours before death. In the efforts to remove one of the tubes, it had slipped into the œsophagus and been swallowed, and at the post-mortem the tube was found at the ileo-cæcal valve.

This case was presented to the Orthopædic Section of the Academy of Medicine and has appeared in its Transactions.

CASE VII. *Congenital; an Elder Sister Similarly affected; Lorenz's Operation; the Y Ligament divided; Rather Prolonged Suppuration; Good Result.*—Female, ten years of age, admitted June 8, 1894. Her deformity was noticed at the time she began walking. For three months prior to admission she had had much pain. A sister has been in the hospital on two or three occasions for tubercular osteitis of the knee, and it was only recently that her hips were discovered to be dislocated.

The comparative measurements on admission were: Right side, from the anterior superior spinous process, 23 inches; left side, 21 $\frac{3}{4}$. The head of the bone could be distinctly made out.

On June 5 the anterior incision was made, the capsule easily



- (A) Normal acetabulum.
 (B) The elongated, slightly depressed area representing the acetabulum.
 (C) Point with which the eroded surface of the internal aspect of the femur articulated.
- The base of the (C. B.) surface to a depth of half an inch filled with cartilage, with here and there a focus of new bone-formation.
- (1) Normal femur.
 (2) Shows shortening and change in angle of neck, flattening and elongation of head as in Fig. 4.
 (3) Normal.
 (4) Eroded area articulating with C.

exposed, a portion of this cut away, and by deep incision with a tenotome the Y ligament was divided. The site of the acetabulum was filled with a small exostosis, which was cut away, a rather deep cavity made, and the head of the bone was easily replaced. She was put on the wood bed with traction.

The suppuration in this case was rather excessive, but there were no complicating abscesses, although counter-openings were made from time to time. On July 9, the measurements were: Right side, $22\frac{1}{2}$ inches; left side, 22. A splint was applied, on which she has been walking during the latter part of the summer.

Comparative measurements to-day are as follows: Right side, from the anterior superior spinous process, $22\frac{1}{2}$ inches; left side, $21\frac{3}{4}$; from the umbilicus, right side, 25; left side, 25. The sinuses are about closed. In one there is a raw surface in front, which is generally covered with a scab. She is dressed about once a week. The limb is in excellent position. Tip of the trochanter is below Nélaton's line. Small range of motion.

In her sister's case nothing has been done in the way of treatment for the hip, but for an old deformity of the knee resulting from osteitis, a supracondyloid osteotomy was done about two months ago, with the result of correcting the deformity perfectly.

CASE VIII. *Congenital (?) ; Occurrence of Pain at the Age of Twelve Years ; Great Slipping of the Head of Bone ; an Acetabular Cyst found at Operation ; Partial Excision ; Attempt to Secure Coaptation ; Failure ; a Secondary Operation ; Epilepsy ; Death One Month Later.*—Female, thirteen years of age, admitted August 8, 1890. The history was that at the age of one year, during an attack of whooping-cough, she suddenly became paralyzed in the left leg. Made a good recovery. Walked perfectly when three years of age, so mother avers. The left leg has always been shorter, however, than the right. After exercise, child is easily fatigued. Four weeks before admission, suddenly and without cause, so far as the mother could make out, a severe attack of pain came on, causing her to cry out at night. The hip became quite hot and tender. Was in bed for two weeks prior to admission. We found the trochanter one and a half inches above Nélaton's line, considerable infiltration about the joint, apparent fluctuation over the trochanter, all motions exaggerated, walking painful. A distinct grating could be felt as the head of the bone was moved up and down. Comparative measurements: Right side, from the anterior superior spinous process, $27\frac{1}{4}$ inches; left

side, $27\frac{1}{4}$; from the umbilicus, right side, 31; left side, $31\frac{1}{2}$. These measurements were made with the limb in traction.

A hip-splint was applied, thinking that we could hold the limb in good position. They were the same real length on October 2, without traction. October 30, as she walked, there was apparently two or three inches shortening,—that is, the head of the bone would slip up and down.

January 10, long incision made posteriorly, the tissues divided about the joint, head of the bone found outside of the acetabulum, and on exploring this cavity with my finger I discovered a cyst-like body, which was ruptured, and discharged nearly an ounce of clear serum. The collapsed cyst was removed, the acetabulum denuded, the head of the bone replaced. During the operation she had an epileptic convulsion, and we were forced to complete the procedures as rapidly as possible.

There was a good deal of hæmorrhage at the time of the operation, and two or three days later we had to open the wound on account of the great tension, and there was an escape of blood and serum. March 20, the head of the bone was apparently in the cavity, and the wound was healing. The limb was half an inch shorter than its fellow. May 7, the wound was healed, all motions at hip seemed to be perfect, producing no pain. Still the head could be slipped out of the acetabulum quite easily. The girl was very large and adipose was quite extensive, so that she got excoriations from her apparatus, and she was put in bed with weight and pulley.

August 27, 1891, she was discharged, wearing a brace, which we thought would hold the limb in position.

She was readmitted August 30, 1893. During this interval she had been a source of great annoyance to the Out-Patient Staff. Her epileptic seizures had been rather frequent, and there was found at this date a large fluctuating tumor on the outer aspect of the thigh. This was opened and about four ounces of pus evacuated. By October 9, the discharge had ceased.

November 3, a posterior incision, under ether, over the trochanter, acetabulum curetted again, head of the femur denuded of periosteum, and a portion of the head removed. This was placed in the acetabulum and held by silver wires.

The temperature from this time on ran high, from 102° to 105° F. Was dressed through fenestrum; pus in great abundance. November 24, wound was doing well. November 28, a series of epileptic convulsions complicated matters, and she died on the 29th.

CASE IX. *Congenital; Typical Age; Dr. Hoffa the Operator; Profuse Suppuration and Septicæmia Following; Result, Great Shortening and Deformity.*—In connection with these cases I desire to put on record a case of Hoffa's operation, done by Dr. Hoffa himself in the operating-room of the Hospital for the Ruptured and Crippled, in the presence of Mr. Howard Marsh, of London, Dr. George Ryan, of Cincinnati, Drs. Ridlon, R. H. Sayre, Ketch, Hubbard, Frank Markoe, Halsted Myers, Whitman, Coley, Townsend, and Milliken.

On September 28, 1891, a girl, two and a half years of age, referred to the hospital by Dr. Berg, of this city. Dr. Hoffa regarded the case as an excellent one for operation. He found distinct shortening and slipping. I am indebted to Dr. C. L. Starr, at that time house surgeon, for the details of the operation. The limb was held flexed at an angle of about 145° , while a straight incision was made about three inches long, in the line of the femur, taking the tip of the trochanter major as its centre. This incision was carried through the gluteal muscles in the line of their fibres, until the capsule of the joint was exposed. The edges of the wound were held back with retractors, and a slit made in capsule, in the same line with and of same length as external incision. The ligamentum teres was divided with curved scissors, and the head of the bone was made to protrude through the opening in the capsule. With a gouge and Volkmann's spoon, the upper part of the acetabulum was scraped out and deepened, so as to form a new cavity for the head of the femur. The cavity thus made was about three-quarters of an inch in depth, and extended very nearly through the whole thickness of the bone. The joint was thoroughly flushed with sterilized water, all bone detritus washed out, the head of the bone placed in the newly-formed acetabulum. Prior to this, however, he divided the muscles attached to the trochanter major and minor through this same opening. After replacing the head into the cavity thus made, it was found that the limb could be brought down parallel with its fellow without throwing the head out of the cavity. The wound in the capsule was now closed with catgut suture, the external wound filled with iodoformized gauze, dressing of bichloride gauze applied, plaster-of-Paris spica extending from the ankle to the lower border of the ribs, traction being made while the plaster was applied. The child bore the operation well, was placed in a private room at the hospital, and put in charge of a trained nurse.

Four hours after the operation the temperature was 104° F. On September 29, 6.30 in the morning, temperature was 103.6° ; had had very little sleep the night previously. The temperature ranged from the 28th to October 1 from 103° to 104° . By October 3 it fell to 101.6° . It went up again to 103° , and did not fall until October 6, when it reached 101° . From this time it steadily increased up to the 9th, when it reached 104° . It did not fall again to 101° until October 16. It was the 19th before it reached 100° . It ranged from this time until October 29 between 100° and 102° . On November 5 it was 101° , and the patient was discharged.

The wound during this time suppurated, the child had diarrhoea from time to time, and the notes show simple repeated dressings, efforts to keep the limb in good position, and to stimulate the child. The wound did not heal until the middle of December. Dr. Starr attended the case, after it was discharged from the hospital, once or twice a week. Paralysis was noted, which continued for about two months.

Dr. Berg kindly made an examination for me, and reported as follows:

"DEAR DOCTOR: In accordance with your request, I have examined the little Ehrmann baby with both electrical currents. I find the following reactions and objective symptoms:

"*Left leg.* Leg atrophied, patellar reflex exalted (on both sides, and much more so on the left). Deep scar between great trochanter and tuber ischii.

"Faradic current. Good contractility to current of moderate intensity in glutæus maximus and medius and quadriceps extensor. No reaction to exceedingly painful currents in biceps and semitendinosus, semimembranosus, anterior tibial group, posterior tibial group, and peronei. No reaction in nerves at the motor points.

"Galvanic current, twelve cells. Normal reactions in quality, excessive in quantity, in glutæi and quadriceps extensor. Absolutely no reaction in flexors of the leg (biceps, etc.), adductor magnus, anterior and posterior and tibial groups, except slight reaction in gastrocnemius and soleus; with reversal of formula, there being a slight, slow contraction of the opening of the anode, and none at opening of cathode, as shown by a movement at the tendo Achillis, so that the paralysis is limited to the region and muscles supplied by the branches of the sciatic nerve.

"Very sincerely yours,

"H. W. BERG, M.D."

During this period also a hip-splint was kept applied. On February 29, 1892, I made a note that the child was walking very well on the splint, limbs were about equal in length, possibly one-quarter of an inch shortening. Child was able to raise the leg from the table

and move the toes a little. Limb is developing, the paralysis is disappearing. Is having no treatment other than the apparatus. April 11, 1892. "Still wearing the brace, though the paralysis seems to have disappeared. Child can move the toes, and can raise the limb up from the table very easily. There is limited motion at hip, at knee, and at ankle. Right anterior, $14\frac{3}{4}$ inches; left anterior, $14\frac{1}{2}$; right umbilicus, $16\frac{1}{2}$; left umbilicus, $15\frac{3}{4}$; right thigh, 4 inches down, 10; left thigh, 4 inches down, $9\frac{1}{4}$; right calf, $6\frac{1}{2}$; left calf, $5\frac{3}{4}$. General condition fair. The trochanter comes under Nélaton's line. It seems to be farther forward than the trochanter on the right side. Apparatus to be left off for three or four days." From this time the patient was kept under observation in the Out-Patient Department, and on November 11 I made the following note: "About two or three weeks ago the child was put under ether, and the adduction overcome by manual force. The joint functions were pretty fair, barring this resistance on the part of the adductors. Limb was put up in abduction. This morning the plaster was removed, and the adductors still a little tense, but this was thought to be due to fear. There is from a half to three-quarters of an inch practical and real shortening." On January 26, 1893, measurements as follows: "Right anterior, $16\frac{1}{4}$ inches; left anterior, $15\frac{1}{2}$; right umbilicus, $18\frac{1}{2}$; left umbilicus, $17\frac{1}{4}$. Tendo Achillis is shortened some, and the foot is in moderate valgus. She can flex to 90° , and extend to about 175° . The adductors are quite tense, and resist abduction. A jointed splint is to be applied with a pad over the trochanter." This was finally applied, and to-day, April 21, I examine her and find one inch shortening. The trochanter is above Nélaton's line. There is a moderate degree of adduction.

This case has been presented to the Orthopædic Section of the Academy, and has appeared in the Transactions.

A careful study of the cases presented in this paper, in connection with a paper published by Dr. Bradford,¹ leads one to be very circumspect in his advice about the propriety of operative procedures.

I am convinced that the failure on my own part to get perfect results has been due largely to the faulty technique in operation. There was a leakage somewhere in every case, and sup-

¹ ANNALS OF SURGERY for August, 1894.

puration followed, in the majority of cases, most profusely. We had, therefore, to combat for many weeks and months a violent arthritis. During this period we ought to have been moving the joint about, and the wound should have been healed. The cases I have taken were beyond the age limit, and I hesitate to present them for that reason, because I am convinced that the operation, in properly-selected cases, is justifiable, and even is demanded in many instances. The operation proposed by Dr. Bradford, which is a modification of Lorenz's, I believe will give better results than that proposed by Hoffa,—that is, in patients beyond four or five years of age. Hoffa's operation for young children is a good one, and I am sure that good results have been obtained, because I have seen many of his cases, and from personal knowledge know that his results are better than the results we have obtained in the more advanced ages. Hoffa himself has experienced much difficulty in managing these older patients. With the division of the Y ligament, and a perfectly aseptic operation, the results ought to be very good, and I am not at all disposed to abandon the procedures for relief. Dr. Bradford seems to have had the same difficulty. He reports, for instance,¹ five operations according to Hoffa's method, and I quote the following:

“A. F., three years old; double deformity; two operations.

“A. W., three years old; single deformity; one operation.

“M. C., three years old; single deformity; one operation.

“M. (col.), three years old; double deformity; two operations.

“H. K., eight years old; double deformity; one operation.

“The result in these cases can hardly be considered satisfactory.

In all except the last the wound healed up thoroughly and well. In the last the wound, a week after the operation, was progressing favorably, but the child was seized with diphtheria, and died three weeks later with diphtheria and sepsis of the wound. . . . In the case of M., colored, the first operation healed readily, but a week after the second operation the patient was taken with scarlet fever and died.

“In the case of A. W., the wound healed, but the child died with symptoms of diarrhoea and vomiting, a month after operation,

¹ ANNALS OF SURGERY, Vol. XX, p. 133.

apparently without any connection with the operation, the wound having entirely healed.

"In the surviving cases, A. F. and M. C., the patients recovered well from the operations (double in the first, and single in the second case). It did not appear, however, that the head of the femur was well fixed in the new acetabulum in either of the cases, or that patient had been materially benefited by the operation.

"The three deaths can hardly be attributed fairly to the operation, the last two occurring at a time when the hospital was visited by an epidemic of contagious disease. It is probable, however, that the operation may have diminished the patient's power of resistance in both these cases, as in the third case."

It is only fair to say that in my own cases the operations were done at a time when sepsis was apparently contagious in this city. To my personal knowledge, in two or three of the large hospitals where all details were regarded as faultless, sepsis did occur after the most carefully-conducted operations.

The conclusions drawn from the data given in this paper are likely, therefore, to be misleading. As mentioned in the early part of the paper, these histories were presented as a study, and I think a careful perusal of the same will enable us to more judiciously select operative cases, and to do less violence to the parts and watch closely all chances for defects in antisepsis.

Dr. T. Halsted Myers¹ has presented a very complete *résumé* of the various operative procedures, as well as the mechanical procedures for the reduction of congenital dislocation of the hip. His conclusions are as follows:

"The number of perfect cures is very small.

The number of cases improved is large.

The results in double dislocations are not so favorable as in single.

The lordosis is generally corrected.

A slight spinal curvature generally persists, owing to the atrophy of limb and pelvis.

The limp persists to some degree almost always, though if the

¹ ANNALS OF SURGERY, August, 1894.

posterior dislocation is relieved, a high shoe will correct this limp almost if not quite perfectly."

The conclusions that may be drawn from the traumatic cases, I think, justify one in advocating arthrotomy without hesitation.

In the following tables, the terms under "result" are sufficiently explanatory, with the exception of the term "good." By this is meant a useful limb, but not a perfect limb. Generally the joint is ankylosed. "Very good" and "perfect," of course, explain themselves.

I have added some cases taken from a very interesting paper by Dr. M. L. Harris,¹ of Chicago, Professor of Surgery in the Chicago Policlinic. The title of his paper is "The Operative Treatment of Old, Unreduced, and Irreducible Dislocations of the Hip." I have selected from his reports such cases as related to the childhood period, and, without including the references in the tables, will simply state in this connection that No. 10,² No. 11,³ No. 12,⁴ No. 13,⁵ No. 14,⁶ No. 15,⁷ are references.

¹ ANNALS OF SURGERY, September, 1894.

² ANNALS OF SURGERY, May, 1893, p. 586.

³ Deutsche Zeitsch. f. Chir., Bd. XXXVII, p. 373.

⁴ Deutsche med. Wochensch., August 10, 1893, p. 761.

⁵ London Lancet, January 23, 1892, p. 194.

⁶ London Lancet, November 1, 1884.

⁷ London Lancet, November 15, 1884.

TABLE I.—CONGENITAL DISLOCATIONS.

Case.	Sex.	Age.	Operator.	Date of Injury.	Date of Operation.	Condition of Wound.	Date of Last Observation.	Result.	Remarks.
3	Female.	9	Personal.	Congenital.	Mar. 6, '94.	Oct. 6, '94, a sinus.	Sept. 27, '94.	Good.	Prolonged suppuration.
4	Male.	7½	Personal.	Congenital.	Nov. 17, '93.	Jan. 27, '94, closed.	Oct. 1, '94.	Relapse; not good.	Suppuration not great, but very difficult to maintain good position; relapse; readmission; diphtheria complicating.
6	Male.	5	Personal.	Congenital.	Oct. 28, '92.	Dec. 2, '92, closed.	Mar. 1, '93.	Relapse.	Died of diphtheria, April 17, 1893.
7	Female.	10	Personal.	Congenital.	June 15, '94.	Oct. 10, '94, a sinus (?)	Oct. 10, '94.	Good.	Much suppuration; a sister has same deformity.
8	Female.	13	Personal.	Congenital (?)	Jan. 10, '91.	June 25, '91, closed.	Nov. 24, '93.	Bad; relapse.	An epileptic; a cyst filling acetabulum producing the deformity; two operations; death from septicaemia and epilepsy.
9	Female.	2½	Hoffa.	Congenital.	Sept. 28, '91.	Dec. 15, '91, closed.	Jan. 26, '93.	Relapse and ankylosis.	Dr. Hoffa, of Würzburg, operated himself; after treatment in Hospital for Ruptured and Crippled.

TABLE II.—TRAUMATIC DISLOCATIONS.

Case.	Sex.	Age.	Operator.	Date of Injury.	Date of Operation.	Condition of Wound.	Date of Last Observation.	Result.	Remarks.
1	Male.	8	Personal.	Nov. '92.	May 19, '93, a secondary one.	Oct. 6, '93, healed.	Oct. 10, '94	Very good; no shortening.	A secondary operation; the first at Mt. Sinai; relapse; suppurative extreme; paralysis not fully recovered from.
2	Male.	8	Personal.	Nov. '93.	Apr. 18, '94.	Sept. 27, '94, about closed, one small sinus	Sept. 10, '94.	Good; limbs equal in length.	A traumatic case; much suppuration.
5	Male.	8	Personal.	In 1890.	Nov. 28, '93.	Mar. 27, '94, closed.	Oct. 10, '94.	Good.	A flail-hip; bones wired.
10	Male.	8	Gerster.	Nov. '92.	Dec. 20, '92.	3 weeks later, healed.	Mar. 8, '92.	Relapse.	The same as Case 1 of this table.
11	Male.	9	Klüster.	Traumatic.	Sept. 23, '92.	Oct. 13, '92, healed.	Aug 5, '93.	Perfect.	Relapsed at the end of three weeks; easily reduced; traction; splint for month.
12	Female.	4	Helferich.	May 5, '91.	May 18, '91.	June 1, '91, healed.	May, '93.	Perfect.	Acetabulum clear at time of operation; an arthrotomy only necessary.
13	Male.	11	Hughes.	Sept. 20, '90.	Dec. 5, '90.	Jan. 20, '91, healed.	July, '91.	Failure to reduce; two in. shortening.	"Cause of the irreducibility was never determined."
14	Male.	11	Wm. Adams.	During rheumatism. Date(?)	Mar. 29, '82.	June 1, '82, healed.	Oct. 1, '82.	Good.	Excision, followed by sup- puration.
15	Male.	11	Sidney Jones.	May, '79.	Nov. 25, '79.	(?)	5 years later.	Good.	Excision.

RESECTION OF THE ILEO-CÆCAL COIL OF THE
INTESTINE; ITS INDICATIONS, RESULTS, AND
MODUS OPERANDI, WITH A REVIEW OF
ONE HUNDRED AND TWO RE-
PORTED CASES AND TWO
HERETOFORE UN-
PUBLISHED.

By WILLIAM S. MAGILL, M.D.,

OF CHICAGO.

L ICHTENSTEIN, from a study of 154 cases of primary carcinoma of the digestive tract, excluding the stomach and rectum, gives the following results: Flexura sigmoïda, 42; colon descending, 11; colon transverse and the two adjoining flexuræ, 30; colon ascending, 6; ileo-cæcal coil (cæcum, appendix vermiformis, and valvula ileo-cæcalis), 32; small intestine, 33.

Thus showing the ileo-cæcal coil occupied by primary tumor as frequently as the entire small intestine, and more than any other intestinal region beyond the immediate vicinity of the rectum.

It is, then, not to be wondered at, that the first resection of the ileo-cæcal coil (Krausshold, 1879) occurs contemporaneous with the first excisions of the intestine for cancer in modern surgery (Billroth, 1879; Czerny, 1880).

The history of the resection of the ileo-cæcal coil is interesting in many ways. At first an operation of last resort, its results were fatal in each case. The progress of abdominal surgery, the skill of the surgeons demonstrated its possibility little by little.

CHRONOLOGICAL TABLE OF RESECTIONS OF THE ILEO-CAECAL COIL.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	? Mo.	Total.	PER CENT. MORTALITY.		
															General.	Neo-plasm.	Tuber-culosis.
1879				28										1	100.00	100.00	
1880														0			
1881									4					1	100.00	100.00	
1882								32						1	0.	0.	
1883														0			
1884			5			41, 73				44	42, 82			6	50.00	50.00	
1885			89							35				2	0.	0.	
1886			6		7, 8	53		23			86			6	33.33	50.00	0.
1887	15		88	3		37					68	50		6	33.33	66.66	0.
1888		54			83		70				91, 97		2	6	0.	0.	0.
1889					9, 31 60, 85		46, 47	61	78	40	77	48, 98		12	33.33	33.33	20.00
1890		10	71		11, 66, 99	55				16, 63		76		9	44.44	66.66	33.33
1891	38	39, 49				94	58	33			27, 67	62, 100		10	10.00	25.00	0.
1892	80	102	5 ¹ , 101 59		57, 79 56, 69				14, 20		52			12	27.27	50.00	16.66
1893	21, 29	22		17, 87	90		24, 39 79, 93	42	1	36, 64	65	19		16	20.00	0.	50.00
1894	92				25												
Date not known = 12, 13, 18, 26, 34, 43, 73, 74, 75, 84, 95, 96 = 12 cases.															Total = 102		
= 2 cases in 1894. 2 + 12 = 14																	

The numbers in the squares represent the case numbers to be found in the statistical table. Numbers 1 to 45, inclusive, are cases operated for neoplasm. Numbers 46 to 69, inclusive, are cases operated for tuberculosis.

The cases of neoplasm are by years. 1879 1880 1881 1882 1883 1884 1885 1886 1887 1888 1889 1890 1891 1892 1893 Total.																	
The cases of neoplasm operated = 1 . . . 1 1 . . 4 1 4 3 1 3 3 4 2 10 = 38																	
The cases of tuberculosis operated = 1 1 1 2 1 5 3 4 6 2 = 24																	
Six cases of cancer, time of operation unknown. One case of cancer operated in 1894 not here counted.																	

The first successful operation was performed by Maydl in 1882, and a reference to the chronological table will show the increasing frequency of the operation with its progressively diminishing mortality. In 1884, Czerny resects the ileo-cæcal coil for invagination, and finds the valvula cancerous. In 1886, resection is adopted by Wassilief for the cure of artificial anus, established for acute invagination. And the same year Czerny performed the first resection for tuberculosis. Maydl, in 1887, resects the coil for cicatricial stenosis, and Billroth for stercoral fistula, in 1888. In 1893, Clarke adopts resection for the treatment of irreducible cæcum in hernia.

GENERAL CONSIDERATION.

Other conditions equal, the surgical activity of nations is well indicated by their literature of the subject. From this point of view it may be interesting to classify by nationalities the published cases of resection of the ileo-cæcal coil. The language in which the publication is found is assumed to be the nationality of the surgeon. A rule which has its exceptions, however.

Of the 102 cases consulted, 66 are German, 13 French, 9 English, 8 American, 4 Italian, 1 Russian, and 1 Scandinavian.

The Germans are foremost in the field, to them belong two-thirds of the cases, the first operation (Krausshold); the first successful operation (Maydl); the first operation for tuberculosis (Czerny); for invagination of the cancerous cæcum (Czerny); for cicatricial stenosis (Maydl); and for stercoral fistula (Billroth). To these *pioneers*, as is frequently the case, is attributable the highest mortality.

Twenty-eight surgeons. Sixty-six cases, of which two having survived the resection, died of the second operation necessary to establish the continuity of the digestive tract. Deducting these two cases, the remaining sixty-four resulted fatally twenty-one times, a mortality of 32.81 per cent.

The ileo-colostomies were once made with absorbable plates (Von Baracz). The operations divide as follows: 28 for neoplastic infiltration; 16 tubercular affections; 6 invaginations of the cancerous cæcum; 6 chronic invaginations; 2 cicatricial

stenoses; 2 stercoral fistulæ each, the result of anterior operation; and 6 pyo-stercoral fistulæ. All published resections of this last class were done by German surgeons.

Four monographs by German authors treat the subject of ileo-cæcal resection very thoroughly. See Körte, Matlakowski, Sachs, and Salzer.

In French, thirteen operations by eleven surgeons are reported. The first successful excision of the ileo-cæcal coil by a French surgeon is reported by Bouilly, a resection for tubercular affection. The thirteen operations are divided into 3 for neoplastic affection, 7 tubercular, 1 chronic invagination, 1 inflammatory stricture, and 1 stercoral fistula, a result of hernia.

Thirteen opérations with four deaths, mortality, 30.77 per cent.

The subject is exhaustively studied in the monograph of Dr. Baillet, published this year.

Nine operations, by as many English surgeons, give two deaths, a mortality of 22.22 per cent. The operations classified as follows: 5 for neoplastic condition, 1 invagination of cancerous cæcum, 1 resection for irreducible hernia, and 2 for stercoral fistula resulting from gangrened hernia. Two of the nine operators terminated the intervention with anastomosis with absorbable plates, two others by implantation, using the rubber ring to aid invagination. Deducting these four cases operated by methods other than the usual suture, the mortality of five cases of intestinal union with sutures is 40 per cent.

Five American surgeons have removed the ileo-cæcal coil eight times: 6 operations for neoplasm, 1 for invagination of cancerous cæcum, and 1 for stercoral fistula resulting from a previous operation. Eight interventions with one death (Senn). Mortality, 12.50 per cent. One of the survivors died of a secondary operation by sutures to restore the digestive canal (Barton), and should, perhaps, be counted as a fatal result.

No study of the subject of resection, confined to the ileo-cæcal region, has been found in the English language.

Four Italian surgeons report cases of resection for neoplastic tumor, four operations with one death. Mortality, 25 per cent.

One operation each is published in Russian and Scandinavian tongues, both interventions successful.

It is to be remarked that monographs of the subject are limited to the Germans and French, and that outside of these two languages no mention of operation for tubercular trouble is found.

The lower mortality of English and American surgeons might be attributed to the neglect to publish unsuccessful cases; but the relation between the frequent use of absorbable plates or anastomotic button and the improved statistics is very striking. The mortality of the English cases, treated with intestinal suture, is found to be 40 per cent., that of the American cases, the death from secondary suture included, is 33.33 per cent. (three cases).

Considering only the operation, not employing plates, buttons, or invagination rings, the mortality by nations becomes German, 33.33 per cent.; French, 30.77 per cent.; English, 40 per cent.; American, 33.33 per cent.; Italian, 25 per cent. Whence it might be concluded that the improved total statistics of English and American surgeons are to be attributed to the superiority of plate or button methods employed by them, rather than to any superior individual skill, for the American cases treated in the same way—that is, adopted by continental surgeons—give a mortality identical with that of the German intervention. The mortality of English cases operated by suture processes is the highest of all nations. But the question of method can only be judged when considered in the discussion of statistical results of resection of the ileo-cæcal coil.

GENERAL SUMMARY.

During the fifteen years that have followed the first intervention, 102 cases of surgical operation that resulted in the resection of the ileo-cæcal coil are reported by fifty-eight surgeons, with sufficient detail for critical study. Twenty-nine of these cases terminated fatally, placing the general mortality at 28.43 per cent.

The variety of pathological condition which necessitated surgical interference is such that a general summary would give but

little aid in discussing the question of resection limited to this region of the digestive tract. Consequently, only classified statistics will be used.

Classification of Cases.—The classification of these cases is a difficult task, certain of them by reason of complication entering into more than one division. Great care has been taken to determine the predominating pathology of each, and thus decide its arrangement under the proper heading.

The cases are divided, and will be considered, as follows :

Class	I Neoplastic affection	45
"	II Tubercular "	24
"	III Invagination,—cancerous cæcum	9
"	IV " —chronic	7
"	V " —acute	1
"	VI Stenosis,—inflammatory or cicatricial	3
"	VII Hernia,—Irreducible cæcum	1
"	VIII Stercoral fistula,—anterior operation	3
"	IX " " —hernia ?	3
"	X Pyostercoral fistula	6
Total		102

Classes II and VI correspond very closely, and might be considered together. The same can be said of Classes VIII and IX.

The different condition of the patient at the time of operation is all that decided the distinction of these classes.

Methods of Operation.—Another distinction must be made according to the method followed by the operator. In fact, an examination of the clinical reports shows that the *modus operandi* is varied thus :

Method 1.—Resection with immediate suture.

- (a) The end of the ileon of the same calibre as the end of the colon.
- (b) The end of the ileon brought to the calibre of the colon by oblique section.
- (c) The ileon terminal sutured into the colon, the calibre of which is adjusted by a V excision or T suture.
- (d) Implantation of the end of the ileon into the side of the colon, the end of which is sutured and reduced into the abdominal cavity.
- (e) Implantation of the ileon as above the colic terminal left in the abdominal wound, subsequently excised or closed by cicatrization.

Method 1.—(f) Invagination of ileon into the end of the colon, maintained by sutures.

(g) Lateral anastomosis, the ends of colon and ileon closed with sutures and reduced.

(h) Lateral anastomosis, the ends of the bowel left in the abdominal wound, subsequently excised, subsequently cicatrized.

Method 2.—Ileo-colostomy, with resection a second operation to remove the excluded coil (Maydl).

Method 3.—Creation of artificial anus,—after resection.

(a) Patient left with anus, and considered as cured.

(b) Enterotome to cure anus.

(c) Secondary suture.

(d) Implantation or invagination with the aid of a rubber ring.

Method 4.—Absorbable plates; lateral anastomosis.

Method 5.—Anastomotic button.

(a) End-to-end approximation.

(b) Lateral implantation, end of ileon into the side of the colon.

GENERAL STATISTICS.

Age, Sex, Mortality.—Of the total number of cases, ninety-six give the sex of the patient; of these thirty-five were females.

Eighty-nine reports note the age, the youngest four years, the oldest sixty-seven, both males. Average age thirty-seven years.

Thirty-five resections of the ileo-cæcal coil, the patients, females, give eight deaths; their mortality is therefore 22.86 per cent.

The same operation performed sixty-seven times on the male resulted fatally in nineteen cases. Male mortality 31.14 per cent.; almost half as much again as that of the females.

CLASSIFIED STATISTICS.

Class I. Neoplastic Affections.—Resection of the ileo-cæcal coil has been performed 45 times by 34 surgeons, for affections of this class.

Forty-four cases, noting the sex, give 15 females, 29 males.

Forty-two cases which report the age show an average of 43.5 years, the youngest five, the oldest sixty-seven; both males.

Fifteen fatal terminations; mortality 33.33 per cent.

Of the 15 females 4 died; their percentage of death is less

than that of the operation, being only 26.66 per cent. While of the 29 males, 11 fatal results give a mortality of 37.93 per cent.

Again the severe mortality of the male is to be noted in comparison with that of the female. Let it suffice to recall this same relation, but with more striking figures, which was found in our review of "Visceral approximation with absorbable plates,"¹ where 61 gastro-enterostomies performed with plates gave 14 deaths, a mortality of 22.95 per cent. Of these, 18 female cases resulted fatally only twice; mortality 11.11 per cent., less than one-half of the mortality of the operation.

Resection; maintained Continuity of the Canal.—In 36 cases the continuity of the digestive tract was maintained after the resection, twice by an end-to-end approximation with the aid of the anastomotic button. Method 5: (a) Both cases completely successful; four times by a lateral anastomosis with absorbable plates. Method 4: Four successes; once by an invagination of the ileon into the colon. Method 1: (f) Also a success.

In the remaining cases, 29 in number, the continuity was established by immediate suture of ileon to colon. These comprise 11 of the fatal cases of resection of the neoplastic coil; their mortality is therefore 37.93 per cent. thus divided:

- Method 1.*—(a) Seven cases of suture of ileon to colon, the calibre being the same; resulted twice fatally; mortality 28.57 per cent.
(b) Three cases in which the ileon was cut obliquely to give a corresponding calibre, and sutured directly to the colon; all resulted successfully.
(c) Eight excisions or suturings of the terminal orifice of the colon to meet the smaller calibre of the ileon; gave four deaths; mortality 50 per cent.
(d) Eleven cases, the correspondence of calibre not indicated, with five deaths, would give the mortality 45.45 per cent.

The oblique incision of the intestine to equalize the calibre, if a difference exists, would appear to be the method of choice, as far as so limited a number of cases may be taken as an indication.

¹ ANNALS OF SURGERY, September, 1894.

Of this series, the entire mortality of thirty-six cases of continued permeability of the digestive canal is confined to twenty-nine operations by methods of suture.

Continuity of Digestive Canal Interrupted.—In nine cases of resection the surgeon terminated the first intervention with an artificial anus. Method 3: Death was the rapid result in four cases; mortality 44.44 per cent.

Of the five survivors, one was cured of his artificial anus by the enterotome applied at the moment of operation; another, after an unsuccessful application of enterotome, continued existence with his uncomfortable infirmity; three others underwent a second operation for the cure of the anus by secondary suture of the intestine. In one of these cases the suture failed entirely, and the patient was forced to live on in his miserable condition. The second reports the cure of the anus, but an abdominal hernia as a result of the laparotomy. The third is claimed to have recovered completely, but the report is too brief to be fully convincing to the effect of the claim.

Nothing, therefore, appears to authorize this interruption of the course of matter in the digestive canal. The statistics condemn such action as severely as the repugnance of the surgeon to create so distressing an infirmity (should) forbids its practice.

Class II. Tuberculosis.—Twenty-four cases of resection for tuberculosis are published by 14 surgeons. The sex noted in 23 reports gives 10 females, for 13 males. Twenty-one where the age is given; average thirty-two years; the youngest ten, the oldest fifty-four; both males.

Twenty-four operations with 4 deaths fix the mortality at 16.66 per cent. The female mortality rests at *zero*. One death the sex not noted leaves the statistics with 11 males, of whom 3 died; the mortality of the male 30.77 per cent.

Of the 24 resections of the tubercular cæcum, two operators terminated the intervention in establishing an artificial anus. *One* of these patients died the next day, the *post-mortem* showing an infiltration of faecal matter at the superior angle of the abdominal wound, the commencement of a suppurating peritonitis, causing the fatal result. The *second* case terminated by an artificial anus

survived the first operation to succumb to a later intervention, to cure the anus by a secondary suture; result fatal the second day following the operation; the cause of death not explained (Chaput).

The 22 remaining cases were treated by resection and immediate suture.

Method 1.—One operation without details; death (Richelot, cited by Baillet).

- (a) Fourteen cases with one death; mortality 7.14 per cent.
- (b) Two cases, of which one resulted fatally fourteen days after the operation; the intestinal suture, failing completely, allowed the establishment of a suppurating and stercoral fistula; symptoms of abdominal infection and death. The *post-mortem* revealed a general peritonitis with subdiaphragmatic abscess.
- (c) Three cases with three recoveries.
- (d) Two cases with two recoveries.

The proportion of one death in six operations is a low mortality for such resection of the intestine; but low as it is, it will be seen by the discussion of the operatory methods that one-half of the deaths in this class were the direct result of the faulty method employed. The other deaths, which were also due to peritonitis, once directly proven to be a result of insufficient suture; and the other case, probably due to the same cause, would allow the conclusion that resection properly conducted and terminated would give an unbroken series of success.

Class III. Invagination; Cancerous Cæcum.—Nine cases operated by eight surgeons with five deaths give a mortality of 55.55 per cent.

Of these cases three were females and six males. The average age 35.2 years; the youngest eight and oldest fifty-five years; both males.

Method 4.—One case, treated with absorbable plates, resulted fatally, the fault of the operator in not excising sufficiently the invaginated colon, resulting in gangrene, perforation, peritonitis, and death.

Method 3.—Twice an artificial anus was made; the patients recovering.

- (c) But one of them, submitting two months later to an operation of secondary intestinal suture to cure the anus, died four days afterwards. "Occlusion by band" (Barton).
- (d) The other artificial anus was operated by implantation of the ileon, aided with a rubber ring. The operation was unsuccessful; the stercoral fistula reappearing, and persisting about six months, but finally healing by slow granulation.

Method 1.—(a) Six cases treated by resection, and immediate suture gave four deaths; mortality 66.66 per cent.

One death the day following the operation attributed to shock. The surgeon (Von Baracz) declares that another time he proposes to use absorbable plates, should their claims be substantiated by the experiments he then undertakes (1891). Von Baracz is now a most ardent supporter of the use of absorbable plates, and his successful resection of the ileo-cæcal coil, published in July of 1894, will be found of great interest in comparison with this fatal case of the same surgeon using sutures in 1891.

One death is said to have been caused by gangrene of the intestine, escape of faecal matter into the peritoneum, peritonitis with its fatal termination.

Another is declared due to general peritonitis, its cause not indicated (Czerny). We are inclined to accuse the intestinal sutures here, in spite of the affirmation that they were sufficient.

The fourth death resulted directly from the filtration of the intestinal contents through the lines of suture (Billroth).

To resume, in this series of nine operations five died within a few days, their death directly attributable to the intervention, a sixth died as the result of a second operation necessary to heal a distressing infirmity.

Of the three survivors two seem to have been radically cured at the end of three weeks; the third suffered with an artificial anus for six months, enduring to no avail the secondary suture which killed the companion case of this series, but he was finally relieved from his infirmity by the cicatrix formed by the granulation of the wound.

The line of action in cases of this class appears to be a generous resection, assuring healthy tissue, rapid and *secure* establishment of the continuity of the bowel. For of the nine operations the only two satisfactory results are found where the immediate and sufficient continuity of the intestinal canal was secured in sequence to the resection.

Class IV. Chronic Invagination.—Seven operations by five surgeons; two deaths; mortality 28.57 per cent.

Six cases report the age and sex. Average age 30.5 years; oldest fifty-two, youngest thirteen; both males. Three females, and the same number of males.

Of the two deaths, the sex of one is not noted; the other fatal case was a female.

Method 1.—(a) Six cases with five good results; one death from peritonitis; cause not given, but a suspicion of insufficient sutures is allowable.

One other case (Müller) resulted fatally. No details of this death are given by Sachs, from whose mention the report is drawn.

The immediate resection with establishment of perfect continuity would appear to be the operation for cases of chronic invagination. The dangers are strictly limited to faulty technique. Otherwise this intervention gives most satisfactory results.

Classes V, VI, and VII.—These classes comprise a number of cases so limited that any deductions would be weakly based on so little experience.

The treatment of acute invagination by an anus after resection, with secondary suture to establish the continuity, resulted in a perfect success (Wassilief). This treatment has been well proven for obstruction of the small intestine, and its success, in the only case of the kind involving the caecal coil, goes far to recommend such procedure.

Three resections for cicatricial or inflammatory stenosis, treated by resection and immediate suture. Result perfect.

The same result follows the resection of the irreducible caecum with immediate suture of the intestine.

Classes VIII and IX. Stercoral Fistula.—Three operations in each class; a total of six; one death (Köcher) by peritonitis, in which the insufficiency of the sutures might be incriminated.

Five successful results. One operation—*Method 5 b*—notes the efficacy of the anastomotic button. Another—*Method 1 (d)*—describes the implantation of the ileon, using the rubber ring proposed by Senn for invagination. The stercoral fistula

persisted for some time, but was finally completely stopped by another operation,—*Method 1 (c)*.

Three operations—*Method 1 (a)*—give two successes for the immediate suture. The third (Billroth) was sutured immediately after resection, faulty union, insufficient suture, re-establishment of the stercoral fistula on the fourth day, with accumulation of matter in the iliac fossa, necessitating another intervention. Result fatal.

To conclude: of the six operations, one with the anastomotic button gave a perfect result. Two immediate suturings of the intestine resulted favorably.

One implantation of the ileon into colon with the aid of a rubber ring was insufficient, and left the stercoral fistula for another operation with fatal result.

Four cases in which the continuity of the intestine was established by suture only give two good results; 50 per cent. of the cases were ultimately fatal, the mortality directly attributable to the use of sutures for the anastomosis.

Class X. Pyostercoral Fistula.—Six operations; the resection followed by immediate suture; two deaths. One (Billroth) on the second day; purulent peritonitis, sero-purulent infiltration at the site of operation. An insufficient suture may be supposed, though no mention of it is made in the report.

The second death (Dillner) followed the operation by four days; insufficient sutures, escape of faecal matter into the peritoneum, with consequent fatal peritonitis.

Of the four remaining cases, one (Billroth) left the hospital five weeks after operation, with a persistent suppurating fistula. In another (Billroth), eight days after the operation, the stercoral fistula reappeared, complicated with suppuration of the sutures. A second operation to cure the fistula, three months and a half later, terminated fatally sixteen days after this intervention. The *post-mortem* revealed a congestion abscess communicating with the fistula, necrosis of the vertebral column, pocket of suppuration next to the fifth lumbar vertebra. A third (Czerny) left the hospital at the end of a month completely cured, and five months later is reported in good health. The fourth (Czerny) showed

pus in the wound the fifth day after operation; a suppurating fistula persists. *Death*, one month later, said to have resulted from intestinal hæmorrhage, but no details are furnished.

Of these six operations for pyostercoral fistula only two patients ultimately survived. One of these was forced to support the slow process of granulation to obtain relief from the stercoral fistula. •

Six anastomoses by stitching proved the insufficiency of suture five times, four of which cases were ultimately fatal.

Of six operations to cure pyostercoral fistula only once did the operation effect a radical cure. The result is not brilliant. The reason may be attributed to the method employed.

The preceding review leaves for consideration several points of the operation which have their importance, and for the discussion of which sufficient data are found in the clinical reports. We refer to the *incision of the abdomen, the extent of resection of the intestine, and the length of time required for the operation.*

Abdominal Section.—Seventy reports describe the incision. Their variety is considerable.

Twice a lumbar incision was made. In each case a diagnosis of affected kidney determined this choice, and therefore this point of attack will not be discussed, although in one case (Gilford) the operation seems to have been terminated with sufficient ease. In the other (Hahn) a supplementary transverse incision was necessary to allow the completion of the intervention.

Twice the incision was made oblique in the direction of the line from the umbilicus to the anterior iliac spine or the middle of the arcade of Fallope. No reason for this incision is offered by the surgeons who operated thus. Its limitations are well pointed out by Dr. Baillet, and no advantage is apparently offered by this choice. •

The incision in sixty-six cases may be considered as of three varieties,—

(1) Median line, fifteen abdominal sections, once from sternum to pubis, three times from sternum to the umbilicus, and eleven times between the umbilicus and pubis.

(2) External border of the right rectus, twenty times, with

five incisions described as vertical to the middle of Fallope's arcade, that which corresponds so closely with the border of the rectus that these sections may be classed together.

(3) Twenty-seven incisions described as oblique from above downward parallel to the crural arcade at various distances from it. Three of these incisions are reported as descending on the anterior vertical line of the axilla, curving inward and downward at a distance of several finger-breadths above the anterior iliac spine.

Discussion of the Incision.—The median section rules in abdominal surgery. Its advantages are well known and indisputable; but does this incision allow easy manipulation in the right iliac fossa? Of the fifteen cases with reported median incision once the section from sternum to pubis was necessary for the successful termination of the resection. Five times the tumor was found above the umbilicus, and the extreme length of the meso allowed the operation by median section. In the remaining cases the manœuvres of ileo-cæcal excision seem to have been possible, but one of them (Broca) was so tediously accomplished that the resection had to be terminated by an artificial anus, which caused a fatal result.

A long mesentery with a meso-cæcum would allow operation with a median section, were there no pericæcal adhesions to be dissected in the iliac fossa. But there being no assurance of the existence of such a meso, and no indication in regard to existing adhesion, we would prefer an easier access to the ileo-cæcal region.

The vertical incision allows more immediate access to the iliac fossa, renders its dissection easy, but several operators are found to have extended the incision by preference in the direction of the line of the axilla, thus transforming it somewhat to the oblique, which follows.

Oblique section is noted most frequently, thus indicating its popularity. The curved variety descending on the line of the axilla, bending inward parallel to the crural arcade, follows well the situation of the ileo-cæcal coil in its normal position. This incision allows of great extension, easy access, and therefore

facilitates to the best degree the complicated manipulations necessary for resection in this region. Dr. Baillet brings out another argument in favor of this last incision. The section of the abdomen traverses three planes of contrarily-directed muscular fibres. Any incision must necessarily cut more or less obliquely at least two of these planes. The vertical section cuts *all three*, another argument for its rejection.

The length of the incision is of necessity variable with the habits of the operator, the indications of each particular case, the complications, and the method employed. In general a length of fifteen centimetres will not be found excessive. The oblique curved incision can be extended at will.

Extent of Resection.—Forty-four cases report the length of resected parts. Twenty-one give only the total length, not distinguishing the colon from the ileon. The average length of excised intestine is found to be 22.5 centimetres. Twenty-three cases distinguishing the length of colon and ileon give an average of 16.2 centimetres of excised colon, 11.8 centimetres of resected ileon.

It will be noted in the statistics of mortality that several fatal results are due to the fault of a too limited excision, a fact to be borne in mind, remembering especially that in cases of invagination *only extensive resection* has given good results.

The greatest length excised was 150 centimetres (Müller). Unfortunately the details of this operation with a fatal result are lacking, and no information in regard to the effect of the excision on the result can be deduced.

As might be expected, the cases of limited excision are found in interventions for cicatricial stenosis and tubercular trouble. Czerny reports the smallest resection, six centimetres of the colon with two centimetres of ileon.

Length of Time Required for Operation.—The time required for the operation varies with the complications, amount of adhesion, and the method employed.

Czerny reports a case of excessive duration. An operation having lasted four hours and a half terminated fatally a few hours later.

Thirty-two cases report the time occupied by the operation.

In four of these cases the continuity of the intestine was established by methods other than sutures, and they will therefore be considered separately.

The remaining twenty-eight cases give an average of two hours and five minutes.

One operation the continuity established with the anastomotic button was completed in one hour's time.

Three operations with visceral approximation with absorbable plates give an average of one hour and forty-five minutes.

In operations of this kind the saving of twenty minutes to an hour, that would appear possible by methods other than sutures, has a great importance.

Results of Successful Operations.—In our consideration of operatory methods, the condition of the survivors was noted as far as affected by the question of method only.

The clinical reports are, in general, silent as to the ultimate fate of the survivors of resection.

Twenty-nine successfully operated cases of neoplastic cæcum mention six instances of formation and persistence of a stercoral fistula, two of these fistulæ were left without treatment, enlarged ganglia indicating a rapid return of malignant disease three and four months later. One suppurating fistula (Billroth) ended in death in marasmus six months after operation. The *post-mortem* revealed the place of the cæcum and colon occupied by a curved canal scarcely permeable to the button of an enterotome, carcinoma of the intestine, secondary carcinoma of the peritoneal covering of the diaphragm, and a right hæmorrhagic pleural effusion.

One fistula cured by granulation.

Another was closed by secondary suture.

No mention of the obliteration of the sixth fistula is found, but the patient is mentioned six months later as in good health, with no trace of malignant disease.

Seventeen cases reporting a good condition after the operation, include three who left the hospital at the end of a month in

good health. One left at the end of seven weeks, in good condition. *Another* was victorious in an athletic contest some time later.

A good condition is noted for two cases at three months, one at five months, one at six months. *Another* at six months had gained twenty pounds in weight. A *third* is reported in excellent health six months later, having gained forty-six pounds the first two months that followed the operation. *One* patient died of recurring malignant disease (sarcoma) after six months' interval. *One* is reported well at four months, *another* at fifteen months, having gained sixty-five pounds. *Another* had increased in weight from 88 to 126 pounds. Matlakowski reports a patient well two years after operation. Rehn's case is reported to have died of the secondary invasion of malignant disease, three years and a half after the resection of the ileo-cæcal coil. These results are too limited to permit conclusions. The recurrence of malignant disease is noted four times, and only twice as the cause of death.

It is much to be regretted that so little information is given on this important question.

The frequency of stercoral fistula after *suturing* the intestine is here noticeable as another indication of the defective continuity obtained by this method.

Sixteen resections for tubercular infiltration note the results to some extent. *Two* patients were forced to support a persistent stercoral fistula at the time of leaving the hospital. *Five* other cases were complicated with stercoral fistulae persisting from one to four weeks, one of them, a pyostercoral fistula was stopped after three weeks' time by the granulation of the wound, the patient leaving the hospital, ten weeks after the operation, in good health. *One* patient gained twelve pounds in nine weeks that followed the intervention, *two* are reported in good health after three months' time. *One* married fifteen months later. *One* case is mentioned well at three weeks, *another* at five months, *another* at one year, and still *another* at twenty months after operation. Czerny reports, three years after the intervention, a woman in good condition, cicatrix smooth, inguinal ganglia larger to the

right than to the left. Cervical ganglia and those of the axilla of increased volume. Diarrhoea, three passages *per diem*.

Enterorrhaphy sutures in seven cases of tubercular excision allowed the formation of a stercoral fistula.

The two cases of resection of the ileo-cæcal coil for chronic invagination, operated by Czerny and surviving the operation, are reported in good health, one four years and the other eight years after the surgical intervention.

The cases of resection for inflammatory and cicatricial stenosis report good health, and gaining weight from three weeks to four months after operation. Affections of this class resemble those of tuberculosis to such a degree that they might well be included under the same head. In both classes, the operation, successful, would reduce the prognosis to that of the general condition of the patient, other tubercular localizations, etc.

No report mentions any reappearance of tuberculosis in the ileo-cæcal region.

The only *post-mortem* which notes the narrowing of the anastomotic orifice is that of Billroth, operation for cancer, ileo-colostomy with *sutures*, death in marasmus six months later, button of enterotome could not pass the orifice of the anastomosis, so great was the contraction.

TABLE I.—RESECTION OF THE ILEO-CÆCAL COIL FOR NEOPLASM.

	Surgeon.	Sex and Age.	Date of Operation.	Recovered.	Died.	TREATED BY RESECTION.			Remarks.
						Artificial Anus.	Secondary Suture.	Primary Suture.	
1	Anger.	F. 46	Sept., '93.	I	.	.	.	I	Cured by enterotome.
2	Barton.	F. 37	" '88.	I	.	I	.	.	
3	Bassini.	M. 22	April, '87.	I	.	.	.	I	
4	Billroth.	" 56	Sept., '81.	.	I	.	.	I	
5	"	" 54	Mar., '84.	I	.	.	.	I	
6	"	" 47	" '86.	.	I	.	.	I	
7	"	F. 43	May, '86.	I	.	.	.	I	
8	"	M. 46	" '86.	.	I	.	.	I	
9	"	" 38	" '89.	.	I	.	.	I	
10	"	" 54	Feb., '90.	I	.	.	.	I	Death; marasmus; 6 mos.
11	"	" 10	May, '90.	.	I	.	.	I	
12	Bramann.	F. 43	" . . .	I	.	.	.	I	Fistula cured by 2d oper.
13	Carmalt.	M. 44	" . . .	I	.	.	.	I	
14	Czerny.	" 47	Sept., '82.	.	I	.	.	I	
15	"	" 52	Jan., '87.	.	I	.	.	I	
16	"	" 48	Oct., '90.	.	I	.	.	I	
17	Dumont.	" 29	April, '93.	I	.	.	.	I	
18	Durante.	F. 56	" . . .	I	.	.	.	I	
19	Ferguson.	F.	Dec., '93.	I	"Murphy button."
20	Frank.	M. 36	Sept., '92.	I	.	.	.	I	
21	"	" 48	Jan., '93.	I	.	.	.	I	
22	Gilford.	F. 27	Feb., '93.	I	.	.	.	I	
23	Hahn.	M. 19	Aug., '86	I	.	I	.	.	Cured by enterotome. "Absorbable plates."
24	Ilott.	F. 50	July, '93.	I	.	.	.	.
25	Jones.	" 54	May, '84.	.	I	.	.	I	
26	König.	M. 48	" . . .	.	I	I	.	.
27	Körte.	M.	Nov., '91.	I	.	I	I	.	
28	Krausshold.	M. 62	April, '79.	.	I	.	.	I	
29	Lawson.	" 40	Jan., '93.	I	.	.	.	.
30	Matlakowski.	" 67	Feb., '91.	I	.	.	.	I	
31	"	" 52	May, '89.	I	.	.	.	I	
32	Maydl.	" 54	Aug., '82.	I	.	I	I	.	"First resect'n of cæcum." "Absorbable plates."
33	Péan.	F. 28	Aug., '91.	.	I	.	.	I	
34	Rehn.	" . . .	" . . .	I	.	.	.	I	
35	Riedel.	M. 51	Oct., '85.	I	.	I	I	.	
36	Ruth.	" 5	" '93.	I	"Murphy button."
37	Sacré.	F. 25	June, '87.	.	I	I	.	.	
38	Santovecchi.	" 50	Jan., '91.	I	.	.	.	I	
39	Sendler.	" 22	Aug., '93.	I	.	.	.	I	
40	Senn.	M. 37	Oct., '89.	I	"Absorbable plates."
41	Trombetta.	F. 40	June, '84.	.	I	I	.	.	
42	Von Baracz.	M. 19	Aug., '93.	I	.	.	.	.
43	VonBergmann	" 35	Dec., '84.	I	.	.	.	I	
44	Von Hofmolk	F. 24	" . . .	I	.	.	.	I	
45	Whitehead.	M. 38	Oct., '84.	.	I	I	.	.	

TABLE II.—RESECTION OF THE ILEO-CÆCAL COIL FOR TUBERCULOSIS.

	Surgeon.	Sex and Age.	Date of Operation.	Recovered.	Died.	TREATED BY RESECTION.			Remarks.
						Artificial Anus.	Secondary Suture.	Primary Suture.	
46	Billroth.	M. 35	July, '89.	I	.	.	.	I	
47	"	" 34	" "	.	I	.	.	I	
48	"	" 39	Dec., '89.	I	.	.	.	I	
49	"	" 10	Feb., '91.	I	.	.	.	I	
50	Bouilly.	F. 44	Dec., '87.	I	.	.	.	I	
51	Broca.	M. 41	Mar., '92.	.	I	I	.	.	
52	"	" 12	Nov., '92.	I	.	.	.	I	
53	Czerny.	F. 34	June, '86.	I	.	.	.	I	
54	"	M.	Feb., '88.	I	.	.	.	I	
55	"	" 54	June, '90.	.	I	.	.	I	
56	"	F. 22	May, '92.	I	.	.	.	I	
57	"	M. 31	" "	I	.	.	.	I	
58	Frank.	" 32	July, '91.	I	.	.	.	I	
59	"	" 25	Mar., '92.	I	.	.	.	I	Stercoral fistula.
60	Gussenbauer.	" 34	May, '89.	I	.	.	.	I	
61	" & Fink.	" 27	Aug., '89.	I	.	.	.	I	
62	König.	F. 33	Dec., '91.	I	.	.	.	I	
63	Reclus.	" 22	Oct., '90.	I	.	I	I ¹	.	See Chaput, under ster- coral fistula. <i>Death.</i>
64	Richelot.	" 27	" '93.	I	.	.	.	I	
65	"	"	Nov., '93.	.	I	.	.	I	
66	Roux.	F.	May, '90.	I	.	.	.	I	
67	Sachs.	" 41	Nov., '91.	I	.	.	.	I	
68	Suchier.	M. 32	" '87.	I	.	.	.	I	
69	Zahlmann.	F. 17	May, '92.	I	.	.	.	I	

¹ Death.

TABLE III.—RESECTION OF THE ILEO-CÆCAL COIL FOR INVAGINATION.

INVAGINATION OF CANCEROUS CÆCUM.

70	Billroth.	F. 40	July, '88.	I	.	.	.	I	
71	"	M. 32	Mar., '90.	.	I	.	.	I	
72	Barton.	" 27	" "	I	.	I	I	.	Second suture. <i>Death.</i>
73	Czerny.	" 45	June, '84.	.	I	.	.	I	
74	König.	F. 21	" "	.	I	.	.	I	"Sarcoma." <i>Death.</i> Gangrene intestine.
75	Lauenstein.	M. 55	" "	I	.	.	.	I	
76	MacCormac.	" 36	Dec., '90.	I	.	I	I	.	"Implant'on rubber ring."
77	Senn.	F. 53	Nov., '89.	.	I	.	.	.	"Absorbable plates."
78	Von Baracz.	M. 8	Sept., '89.	.	I	.	.	I	"Sarcoma." <i>Death.</i> Col-lapsus.

TABLE III.—RESECTION OF THE ILEO-CÆCAL COIL FOR
INVAGINATION.—(Continued.)

INVAGINATION—CHRONIC.

	Surgeon.	Sex and Age.	Date of Operation.	Recovered.	Died.	TREATED BY RESECTION.			Remarks.
						Artificial Anus.	Secondary Suture.	Primary Suture	
79	Boiffin.	M. 24	May, '92.	I	.	.	.	I	
80	Braun.	F. 23	Jan., '92.	I	.	.	.	I	
81	Czerny.	" 36	July, '83.	.	I	.	.	I	
82	"	M. 52	Dec., '84.	I	.	.	.	I	
83	"	" 13	May, '88.	I	.	.	.	I	
84	Müller.	. . .	. . . .	.	I	.	.	I	Resection of 150 centime- tres.
85	Rosenthal.	F. 35	May, '89.	I	.	.	.	I	Resection of sixty centi- metres.

INVAGINATION—ACUTE.

86	Wassilief.	M. 25	Nov., '86.	I	.	I	I ¹	.		¹ Three times unsucces- fully. Finally cured by enterotome.
----	------------	-------	------------	---	---	---	----------------	---	--	--

TABLE IV.—RESECTIONS OF THE ILEO-CÆCAL COIL FOR STRICTURE
AND FISTULA.

(a) For Stricture (inflammatory, cicatricial).

87	Hartmann.	F. 32	April, '93.	I	.	.	.	I		
88	Maydl.	M. 23	Mar., '87.	I	.	.	.	I		
89	"	F. 24	" '85.	I	.	.	.	I		Operation in two stages. The resection followed ileo-colostomy by one year's interval.

(b) Irreducible Cæcum in Hernia.

90	Clarke.	. . .	May, '93.	I	.	.	.	I		
----	---------	-------	-----------	---	---	---	---	---	--	--

(c) Stercoral Fistula. Result of Operation.

91	Billroth.	M. 40	Nov., '88.	I	.	.	.	I		
92	Ferguson.	F.	Jan., '94.	I	.	.	.	.		" Murphy button."
93	Köcher.	M. 45	July, '83.	.	I	.	.	I		

TABLE IV.—RESECTIONS OF THE ILEO-CÆCAL COIL FOR STRICTURE AND FISTULA.—(Continued.)

(d) Stercoral Fistula. Result of Hernia.

	Surgeon.	Sex and Age.	Date of Operation.	Recovered.	Died.	TREATED BY RESECTION.				Remarks.
						Artificial Anus.	Secondary Suture.	Primary Suture.		
94	Davies-Colley.	M.	June, '91.	I	.	.	.	.	.	Implantation with rubber ring.
95	Doyen.	...	...	I	.	.	.	I	.	
96	Milton.	M. 4.	...	I	.	.	.	I	.	

(e) Pyostercoral Fistula.

97	Billroth.	F. 45	Nov., '88.	.	I	.	.	.	I	Insufficient suture. Fistula persists. Second operation May 3, '90. <i>Death.</i>
98	"	M. 26	Dec., '89.	I ?	.	.	.	.	I	
99	"	" 17	Mar., '90.	I	.	.	.	.	I	Insufficient sutures, allow fistula, but finally cured.
100	Czerny.	"	Dec., '91.	I	.	.	.	.	I	Insufficient suture. Fistula persists. Death, one month later, said to be due to intestinal hæmorrhagia.
101	"	" 31	Mar., '92.	I ?	.	.	.	.	I	
102	Dillner.	" 23	Feb., '82.	.	I	.	.	.	I	Insufficient suture. Escape of fecal matter into peritoneum. Peritonitis. <i>Death the fourth day.</i>

DEDUCTIONS.

Having finished the clinical review, tabulated its results, examined and classified the methods of resection of the ileo-cæcal coil, and noted the indications for this intervention, it may be well to put in concise form the justifiable conclusions which shall serve as a guide in describing as exactly as possible a regular methodical operation for the resection of the ileo-cæcal coil.

Excision of the cæcum should be attempted in every case of primary neoplastic tumor, where extensive infiltration of the vicinity or ganglia is not present to forbid the intervention.

Tuberculosis or inflammation localized at the ileo-cæcal coil should determine its resection in every case in which the immediate operation is possible without surpassing the patient's power of resistance, provided that other tubercular localizations be not so extensive as to render the advantage of this radical operation only temporary.

Examination of reports of tubercular cases leads to the hypothesis that operated appendicitis with unsatisfactory results—persisting fistula, repetition of accidents, induration, etc.—is amenable to resection. That primary excision of the ileo-cæcal coil would be less dangerous than and preferable to excision for fistula. A careful diagnosis should therefore be made to determine this point before operating.

Invagination in the region of the cæcum is frequently complicated with cancerous disease and in any case of resection, the excision should be extensive to assure the result.

The longer the time that separates the actual condition of the parts from a state of acute inflammation, the better are the results of the operation assured.

Fistula of the ileo-cæcal coil can safely be treated by resection, if no extensive suppuration has invaded, nor be allowed to enter, the iliac fossa.

An irreducible cæcum may be excised with safety.

After resection, in all cases, the continuity of the digestive tract must be immediately established and secured against leakage. The only exception might be made for acute obstruction.

The continuity has been sought by uniting the intestine, with sutures, with a lateral anastomosis with absorbable plates, with a terminal or lateral implantation of the ileon into colon, best effected with the anastomotic button.

The greater part of the mortality of resection of the ileo-cæcal coil is directly imputable to the insufficiency of the sutured intestine. Many of the recoveries show the leakage of intestinal contents through the line of sutures, by the formation and persistence of stercoral fistulæ.

The length of time required for operation is maximum for sutures.

With the exception of a fault of too little excision, not a reproach is found for resection followed by ileo-colostomy with absorbable plates or with the anastomotic button.

These last two methods have time-saving advantages.

These statements correspond with the results of the plates and buttons elsewhere demonstrated.

The conclusion is, therefore, justifiable that sutures are not to be used for establishing the continuity of the digestive tract after resection of the ileo-cæcal coil.

The use of absorbable plates and of the anastomotic button will be described for the ileo-colostomy of this operation.

Preparation of Patient.—The preparation for resection of the ileo-cæcal coil is often possible, the operation being rarely necessary for occlusion already complete. The patient can, therefore, benefit by a milk diet continued for several days, mild but repeated purgation to assure the vacuity of the intestine, the contents of which may be rendered aseptic by the administration of naphthol or other intestinal antiseptics.

The general condition of the subject for operation should be attended to.

The intervention decided upon, the abdomen is prepared for laparotomy in the usual manner.

Anæsthesia obtained by the successive action of ethyl bromide and chloroform will be found to be the most rapid and to cause the least discomfort to the patient before and after operation. The subject should be brought into the operating-room already anæsthetized.

Operation.—After assuring the asepsis of the region with a toilet and sterilized compresses, incise the abdomen, commencing in the vertical anterior line of the axilla, at a small distance below the costal border if a large wound is desired, otherwise at a point lower down.

With a sharp scalpel cut boldly down through the skin and cellular tissue, curving the incision downward and inward, passing at a distance of two to three finger-breadths above the anterior iliac spine, paralleling the crural arcade, to terminate the cut at the point of intersection with the imaginary vertical line to the

middle of Fallope's arcade. Deepen the wound regularly, passing the knife the entire length of the incision with each repeated cut, dividing methodically the muscular layers until the peritoneum is exposed intact in the wound. Complete the hæmostasis with the application of pressure forceps and careful sponging.


With a toothed forceps pick up a transverse fold of peritoneum. Assured that nothing but peritoneal tissue is gripped, an aid takes up the same fold, seizing it with a hæmostatic forceps at a slight distance from the first hold, which is still maintained while the point of the knife delicately cuts the fold, thus held up, to allow the insertion of the blunt-pointed scissors. The aid releases his grip on the fold, placing the hæmostatic forceps on the edge of the incised peritoneum, one branch on the interior surface, the other external. The same manœuvre is accomplished by the surgeon, changing the toothed for a pressure forceps. The point of the scissors introduced by the small peritoneal incision, the edges of which are held up by the forceps, accomplishes the complete section of the tissue without danger, especially if care be taken to cut between two fingers slid under and raising up the peritoneum.

The wound held open with spreaders shows the omentum frequently adherent in the cæcal region. Break carefully these adhesions and push the omentum to the left, thus exposing the ileo-cæcal coil. If the meso-cæcum exists and its length together with the absence of adhesion allows manipulation outside of the abdomen the operation is greatly facilitated. Otherwise, as is more frequently the case, the natural—short or absent meso-cæcum—or pathological fixation of the coil must be overcome. Descending the ileon to the extreme of free and healthy tissue, empty, and secure against reflux of contents, about fifteen centimetres of the small intestine, by ligating with gauze bands, or by clamps. Surround the parts with aseptic towels and section the small intestine between the two ligatures, close to the inferior band or clamp. Take care that the appendix be not cut by the section of the small intestine; its frequent position in the angle of the coil exposing it to this accident which, if unseen, might

determine a peritonitis. The superior end of the sectioned small intestine is covered with a towel and maintained by an aid.

The operator holding the cæcum with its adjoining section of small intestine, liberates carefully the adhesion of the cæcal coil in the iliac fossa, directing with the fingers and knife, preferably from below upward, commencing with the external side of the cæcum. In this way the entire mass is detached. It may be necessary to remove portions of the iliac fascia because of the extensive adhesion. Continue to detach the parts until the point of proposed section of the colon is reached. The coprostasis is then obtained in the manner described for the ileon. The parts are surrounded with aseptic towels, and the section of the colon is accomplished, close to the band placed nearest the cæcum. The ileo-cæcal coil is alone held by the mesentery, which is sectioned after placing two clamps in *V* position to secure the hæmostasis temporarily. The coil is now completely detached and removed. Ligate the mesentery included in each clamp, with the double interlocking thread employed for a pedicle. Remove the clamps by cutting the tissue close to their edge of compression. The extirpation of any remaining ganglia, that may be necessary, will be accomplished by careful dissection of each gland to avoid interference with the blood-supply of the neighboring intestine.

Secure all bleeding points in the iliac fossa, or of the resected mesentery. Bring the cut end of the colon out of the abdomen. Protect the peritoneal cavity and proceed to the ileo-colostomy.

 Two methods will be described:

- (a) Lateral anastomosis with absorbable plates.
- (b) Lateral implantation with the aid of the anastomotic button.

A. Close the ends of the ileon and colon, by overhand stitch with a running thread traversing all the coats of the bowel. Invert the stitched ends into the lumen and maintain this position by a row of sero-serous sutures. Parallel the ileon to the colon, the ends of both viscera directed downward.

At a distance of from three to five centimetres from the extremity of the ileon incise the bowel opposite its mesentery

insertion longitudinally, of sufficient length to admit when slightly stretched the smaller diameter of the plate (three centimetres), which is slid into the intestine, using no force. The position adjusted, pass the needles of the lateral threads through all of the intestinal coats at opposite points, half-way from the extremities of the incision, and near to the edge. Place the terminal threads in the respective angles of the cut. Cover all with a towel and pass to the colon, into which a plate is fixed in the same manner. The incision of the bowel may give rise to a slight hæmorrhage, easily arrested by momentary compression. Complete the toilet of the parts. Scarify lightly the serous surfaces to be approximated. Bring the plates together, tie the posterior threads, secure each terminal knot, and, lastly, tie the anterior threads. Draw each knot to assure complete contact, but not tight enough to cause any interference with the circulation of the intestinal coats included in the area of the plates.

Cut the threads close to the knots, which are pushed between the plates with a director. Assure, by careful inspection, that the edges of the intestinal wound are entirely concealed between the coapted surfaces.

A few supplementary sero-serous sutures may be placed along the border of the plates to prevent slipping and assure the mind of the surgeon if he doubts the absolute continuity obtained by threads alone.

The approximation is complete. The toilet and reduction of the parts bring us to the closure of the abdomen, which will be described after the next method of ileo-colostomy.

B. Implantation; Anastomotic Button.—The end of the ileon anastomosed with the side of the colon, the end of which is closed by sutures, was adopted by Billroth as a means of reproducing a cæcum, and thus retaining a normal condition. Whether there is any advantage in this procedure *using sutures* the statistics fail to demonstrate.

The implantation is easily and rapidly accomplished with the aid of the anastomotic button, and would be preferable to an end-to-end approximation with the same instrument, for it avoids the inconvenience of adjusting the calibre and drawing in the colon

without puckering about the button, thus causing a difficult approximation.

Resume the operation after excision of the ileo-cæcal coil. The end of the ileon is overlapped with a running thread, as indicated in the *modus operandi* of end-to-end union with the anastomotic button. The thread in position, insert the male half of a medium-sized button, draw up the thread, and with it the end of the bowel which is gathered and secured about the central metallic cylinder with a double knot. Cut the threads closely.

Close the end of the colon with inversion and sutures, as described for lateral anastomosis. Parallel to the axis of the colon, at three centimetres from the extremity, pass the loop of silk thread necessary to U, the proposed line of incision. Incise the bowel at this point for a sufficient length—two-thirds the diameter of button—to allow the insertion of the vertically-inclined half of the button which contains the spring attachment. Maintain the compression of the spring bowl with the forceps, a branch on each bowl, internally and externally holding them together. Seize the cylinder of the button with another forceps and let go with the first pair as the U-thread draws the bowel up around the cylinder where all is fixed in knotting the thread, the ends of which are closely cut.

Bring the halves of the button together, assuring by a close inspection that the edges of the bowel are entirely within the circumference of the bowls. Press the button to obtain a compression sufficient to cause the desired atrophy. Remove the bands or forceps from the intestine, together with all towels. Complete the toilet and reduce the parts to their normal position.

Closure of the Abdomen.—Spread out the omentum over the parts and close the abdomen, sewing the peritoneum with lock-stitches of fine silk, the muscular sheath with running silk thread, and the skin with spaced sutures of silkworm gut or wire. Aseptic dressing, during the preparation, of which the patient should have recovered consciousness.

Aside from a special indication no drainage should be attempted. The clinical cases frequently show its uselessness as a safeguard, and its rôle in forming fistula is well known.

Complication.—The dissection of adhesions in the iliac fossa has several times exposed the iliac vessels, without occasioning any trouble whatever. Once the ureter was cut and determined an immediate nephrectomy. The fatal result of this case (Czerny) does not appear to be in any way attributable to this accident, of which a warning is sufficient to prevent its recurrence. The complications that may follow the operation are especially those of insufficient continuity which, *frequent* with the use of suture methods, should disappear with their abandonment.

Post-Operatory Care.—The operation in itself rapidly reduces the danger of shock, and a particularly favorable condition may be expected where the successive anæsthesia has been used. The patient should be warmly covered in bed, warmed by applied heat, and carefully watched. There is rarely any nausea after successive anæsthesia. A little champagne may be given the following day, to be followed by the administration of milk in small quantities, and other liquid and easily assimilated food. It will be remembered that alimentation can safely be much more rapidly resumed after ileo-colostomy by plate or button methods than when sutures were depended upon. The advantages of prompt nutrition have been exposed in cases of gastro-enterostomy with absorbable plates. What was said there need not be repeated here. But for ileo-colostomy rectal alimentation should not be tried. The nursing, dressing, etc., is that of any laparotomy.

UNPUBLISHED CASES.

In our general considerations the statement was made that no mention of surgical intervention of this kind for tubercular trouble was found in other than German and French publications.

Our inquiry has, however, succeeded in discovering a case of resection of the ileo-cæcal coil for tuberculosis, which has not been published. Through the kindness of Dr. Beck, of Chicago, the surgeon of this case, the following details have been obtained, and their publication, it would seem, constitutes the first mention of ileo-cæcal resection for tubercular trouble to be found in this country.

CASE *Tuberculosis Valvulae Ileo-Cæcalis; Pericæcitis; Adhesion; Resection; Ileo-Colostomy; Circular Enterorrhaphy; Recovery.*—The patient, a woman, thirty-one years old, with tubercular history, had always been healthy, until March, 1891, when she consulted Dr. Beck, complaining of a heavy pain in the right hypogastric region, diarrhoea, the stools bloody.

An examination revealed induration in the region of the cæcum, with pericæcal infiltration surrounding the peritoneum. A defined tumor could be distinguished.

Operation.—By an oblique incision passing above the anterior iliac spine, inward and downward parallel to the crural arcade, the abdomen was opened, allowing the dissection of the infiltrated mass formed by the diseased ileo-cæcal coil. The resection accomplished, the ileo-colostomy was performed with sutures.

After the operation the temperature remained normal for some time, the progress of the patient without notable incident, when a swelling above the incision was noted. This developed and opened, gave a discharge of greenish pus, in which some of the sutures were found. After discharge the fistula closed rapidly, and the patient recovered completely.

At the present time, September, 1894, the woman is living in Iowa, working regularly, and enjoying fairly good health.

The examination of the excised specimen showed tubercular infiltration of the valvula ileo-cæcalis with pericæcal adhesions.

Since this operation Dr. Beck has abandoned the use of sutures for the ileo-colostomy, and has again resected the ileo-cæcal coil, this time for cancer. The intestinal anastomosis was made with the aid of the button. Details of this successful case will be published later, the operation being still so recent that many interesting points could not now be given.

These two unpublished reports of ileo-cæcal resection should be added to those of the table, and thus the mortality in each class be lessened by the additional success.

SOME CASES—INDICATION INCOMPLETE OR NOT CONSULTED.

- Ester* : Montpellier méd., 1892, Vol. I, p. 517.
Martin : Jahresb. d. schles. Gesell. f. Vaterland. Cult., 1892, published in
 Breslau, 1893, Vol. LXX, p. 51.
Potempski : Bull. di R. Accad. med. di Roma, 1892-1893, Vol. XIX, p. 25.
Socin : Klin. Bericht des Chir., abth. des Basler Burgespitals, 1888.
Thiersch : Berliner klin. Woch., 1882, p. 616.
Von Hofmolk : Wien. Med. Presse, 1888, No. 11, cited by Matlakowski.
Wolfler : Cited by Baillet,—Resection for Fistula. Death.
Richelot : Cited by Baillet,—Resection for Cancer. Operation, December 23,
 1893. Result not given.
Lejars : Cited by Baillet. Page 8.
Bazy : Cited by Baillet. Page 8.

BIBLIOGRAPHY.

- Anger* : Bull. de la Société de Chir., 1893, Vol. XIX, p. 636.
Von Baracz : Arch. f. klin. Chir., 1891, Vol. XLII, p. 501.
 Centralblatt f. Chir., 1894, p. 617.
Barton : Phila. Reporter, 1888, p. 597.
 In Baillet, Thèse de Paris, 1894.
 ANNALS OF SURGERY, 1893, Vol. XVIII, p. 322.
 See Report of Trans. of Phila. Acad. of Surgery, Meeting of April 3,
 1893.
Bassini : Congrès des Sciences de Padua, 1887, in Baillet.
Von Bergmann : In Michels, Thesis, see Baillet, p. 20.
Billroth (see *Salzer*) : Arch. f. klin. Chirurgie, 1892, Vol. XLIII, p. 101.
Boiffin : Arch. Provinciales de Chir., 1892, p. 291.
Bouilly : Congrès Français de Chirurgie, 1889.
 Revue de Chirurgie, 1888, p. 697.
Bramann : Verhandlung der deutschen Gesell. für Chir., Berlin, April 14,
 1893.
 See Haasler.
Braun : Arch. f. klin. Chir., 1893, Vol. XLV, p. 358, Case VIII.
 Verhandl. d. deutsch. Gesell. f. Chir., 1892, Vol. XXI, p. 504; reported
 in Berlin. klin. Woch., 1893, p. 583.
Broca : Bull. de la Soc. anatomique, 1892, 4 mars.
 In Benoist, Thèse de Paris, 1893.
 In Baillet, Thèse de Paris, 1894, Obs. 41, p. 68.
Carmalt : International Clinics, 1891, Vol. III, p. 113.
Chaput : Arch. Gén. de Méd., 1891, p. 699.
Clarke : Trans. Clin. Soc. (Lond.), May 12, 1893.
Czerny : Beiträge f. klin. Chir., 1892, p. 661.
Davies-Colley : Guy's Hospital Reports, 1891.
Dillner : Archiv. Langenbeck, 1889.
Doyen : Archives Prov. de Chirurgie, 1893.
Dumont : Corres. Blätt. f. Schweizer Aertze, 1893, Vol. XXIII, p. 520.

- Durante* : Rif. Med., 1890; see also Sachs.
- Elliot* : Boston Med. and Surg. Journal, 1894, Vol. cxxx, p. 285.
- Ferguson* : See Murphy, Cases XVIII and XXI, in Chicago Clinical Rev., June, 1894.
- Fink* : See Gussenbauer.
- Frank* : Wien. klin. Woch., 1892, p. 390.
See Clinic, Albert in Internat. klin. Rundschau, 1893, pp. 934, 1006.
- Gilford* : Lancet, 1893, Vol. II, p. 241.
- Gussenbauer* : Prag. med. Woch., 1890, p. 101.
- Hahn* : Berliner klin. Woch., 1887, p. 446.
- Hartmann* : In Baillet, Thèse de Paris, 1894, Obs. 43, p. 73.
- Haasler* : Arch. f. klin. Chir., 1893, Vol. XLVI, p. 285.
- Von Hofmolk* : Wien. med. Presse, 1885, p. 746.
- Hott* : Lancet, 1894, Vol. I, p. 538.
- Jones* : Lancet, Vol. I, January 10, 1885.
- Kocher* : See Sachs in Deutsche Zeit. f. Chir., 1891, Vol. xxxii, p. 93.
- König* : Deutsche Zeit. f. Chir., 1893, Vol. xxxiv, p. 71, Case V.
Centralblatt f. Chir., 1889, p. 929.
Arch. f. klin. Chir., 1890, Vol. xl, p. 905.
Berlin. klin. Woch., 1890, p. 458.
- Körte* : Berlin. klin. Woch., 1893, p. 904, report of Freie Verein. d. Chir.-Sitzung, March 13, 1893.
- Krausshold* : Centralblatt f. Chir., 1881, Vol. viii, p. 184.
- Lauenstein* : Verhandl. d. deutsche Gesell., 1890, in Baillet.
- Lawson* : Lancet, Vol. I, March 25, 1893.
- MacCormac* : Lancet, 1892, p. 310.
- Matlakowski* : Deutsche Zeit. f. Chir., 1892, Vol. xxxiii, pp. 343, 349.
- Maydl* : Wein. med. Presse, 1883, p. 438.
Wein. med. Presse, 1885, p. 463.
Wein. med. Zeitung, 1887, No. 17.
- Milton* : Lancet, 1894, Vol. I, p. 468, Case III.
- Müller* : Brun's Beiträge, Vol. II, 1887.
See Sachs.
- Péan* : In Baillet, Thèse de Paris, 1894, p. 28, Obs. 13.
- Reclus* : See Chaput.
- Rehn* : Verhandl. d. XIX. Cong. der Deutsche Gesell. f. Chir. zu Berlin, April 12, 1890.
See Sachs.
- Richelot* : Bull. de la Soc. de Chir., 1893, p. 622.
Baillet, Thèse, 1894, p. 14.
- Riedel* : Deutsche med. Woch., 1886, p. 252.
- Rosenthal* : Berlin. klin. Woch., 1890, No. 41.
- Roux* : Rev. méd. de la Suisse Romande, 1891.
- Ruth* : Tri. State Med. Journ., 1893.
Communication écrite.
- Sachs* : Arch. f. klin. Chir., 1892, Vol. XLIII, p. 428.
Deutsche Zeit. f. Chir., 1891, Vol. xxxii, p. 93.
- Sacré* : See Jacobs, Presse Med. Belge, 1887, p. 241.

- Salzer*: Arch. f. klin. Chir., 1892, Vol. XLIII, p. 101.
 Verhandl. d. Deutsche Gesell. f. Chir., 1891, Vol. XX, p. 305.
Santovecchi: Atti del XIV. Congresso Gen. della Associazione Med. Ital., 1891.
 Pub. at. Siena, 1893, p. 207,
Sendler: München. med. Woch., 1894, No. 1, p. 3.
Senn: Journ. of Am. Med. Asso., 1890, p. 845.
Smith: Med. Press and Circular, 1894, p. 81; "Partial Resection."
Suchier: Berlin. klin. Woch., 1889, p. 617.
Trombetta: Giorn. di clin. Therap., 1885.
Wassilief: Chir. Westnik (Warsaw), 1887.
Whitehead: Brit. Med. Journal, 1885, Vol. 1, p. 171.
Zahlmann: Hospitals tidende, 1892, No. 36.

Consult in German:

- Cserny*: Beiträge f. klin. Chir., 1892, p. 661.
Matlakowski: Deutsche Zeit. f. Chir., 1892, Vol. XXXIII, p. 321.
Sachs: Arch. f. klin. Chir., 1892, Vol. XLIII, p. 428.
Salzer: Arch. f. klin. Chir., 1892, Vol. XLIII, p. 101.

Consult in French:

- Baillet*: "La Resection du Segment Ileo-cæcal de l'Intestin," Thèse de Paris, 1894.

ETHER ANÆSTHESIA; CLINICAL NOTES ON THREE HUNDRED CASES.

By G. GORDON CAMPBELL, M.D.,

OF MONTREAL,

ASSISTANT DEMONSTRATOR IN MEDICINE, MCGILL COLLEGE; ASSISTANT PHYSICIAN,
MONTREAL GENERAL HOSPITAL.

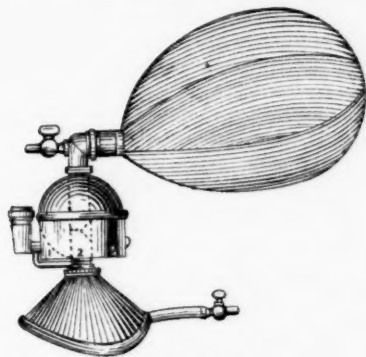
THE additions of late to the literature of anæsthesia have been so largely through experimentation on the lower animals that, in treating the subject from another stand-point,—that is, from observations made by the anæsthetist at the bedside and at the operation table,—I have ventured to think we may obtain some valuable information. As a great part of my work depends, both in the results achieved and in the possibility of recording them correctly, upon the form of inhaler used, a description of it will be in order first.

The instrument used throughout was Clover's ether inhaler, well known and popular in England, but not so widely known on this continent as it deserves. The principle on which it is constructed will be easily understood from the following description taken from Joseph Mill's article on anæsthesia in Treves's "Manual of Surgery" and from the accompanying cut.

"The inhaler consists of a face-piece with an indicator, which, by rotation, may be made to point to O, 1, 2, 3, or F, on the circumference of a metallic vessel containing fluid ether; and of a bag, into which and from which the patient breathes. It is so constructed that when the indicator is at O, the expired and inspired air passes to and from the bag, without in any way communicating with the ether-chamber. If the indicator stands at F, the whole of the expired air must pass through the ether-vessel to the bag, and at inspiration return from the bag through the ether-vessel. When the indicator is at 2, half the respired air passes to and from the bag direct; the other half passes through the ether-vessel; and so on for the other

numbers. The air does not pass through the ether, but simply through the vessel containing it, and this is sufficient to carry off a large amount of its vapor." A slight addition has been made to the instrument lately in the form of an elbow, which allows the face-piece to be coupled to the ether-reservoir at right angles, if necessary, so that the ether-reservoir can still be kept horizontal with the patient lying on the side.

The Method of Administration used.—Before beginning, I always explain to the patient the possible disagreeable effects of inhaling ether, its pungent, irritating vapor, and its tendency at the outset to cause coughing and choking sensations; I take care, at the same time, to let it be understood that I shall endeavor to prevent these undesirable effects, as far as possible, by allowing



Clover's Inhaler.

frequent breaths of pure air, if necessary. The pillows are so arranged that the patient's head is low and in a line with the body,—that is, as it would be held in standing, and not at an angle with the thorax, as it usually is while lying in bed. An ounce and a half, fluid measure, is put into the reservoir, and it is rotated so that the indicator points to o. The patient's eyes being closed, the inhaler (with the tap attached to air-cushion of the face-piece open) is placed on the face and tilted away from the chin so that the mouth is left free; the patient is then directed to take several deep breaths, and the face-piece lowered in time to catch each expiration, and raised again at inspiration; and thus the bag is filled with expired air. The tap of the air-cushion is closed while the inhaler is pressed against the face

during expiration. The patient is now directed to breathe quietly; and the ether-reservoir is turned so that the indicator points to about one-fourth of the distance of 1 from 0; which means that the patient is getting about 5 per cent. of ether vapor in the air breathed, reckoning as 100 the proportion of ether vapor which will be mixed with the air, when the indicator points to F.

As usually happens, after several deep breaths, the succeeding ones are shallow as compared to the normal; and thus a very small amount of ether vapor is inhaled at the outset, and its irritating effects are reduced to a minimum. After a few breaths, and before there can possibly have been any sensation due to the deprivation of pure air, one end of the inhaler is raised and the patient allowed an inspiration from without; and then the reservoir is slowly turned, so as gradually and imperceptibly to increase the strength of ether vapor in the air breathed; a breath of pure air from without being given every now and then, as the want of it is seen to be causing distress. At the first sign of intolerance, such as swallowing, raising the hand, or ceasing to breathe, the inhaler is raised and the patient directed to take a deep breath; and if this fails to produce the desired result, the reservoir is turned back so as to diminish the strength of the ether vapor. On again increasing its strength care is taken not to exceed the limits of tolerance. Very soon a stage is reached at which the patient seems to fall asleep, and regular deep breathing ensues; there being either an extremely slight stage of excitement, or more frequently none at all. I call this the sleeping stage, because the patient is, to all intents and purposes, in the condition of deep sleep, and not of surgical anæsthesia. Once this stage has been reached, however, the strength of ether vapor can be quickly increased; and full anæsthesia, with loss of the corneal reflex and general muscular relaxation, rapidly ensues. By following strictly this method, I have had but two cases of struggling or screaming in 300 administrations,—that is, less than one in a hundred of my patients has required to have even the hands held, for purposes of restraint, while taking the anæsthetic. This is undoubtedly a very low propor-

tion, even under the most favorable circumstances; and I think no stronger argument can be adduced in favor of the induction of anæsthesia by gradually increasing the dose of ether as compared with the method of giving it by keeping a saturated sponge or gauze a few inches from the patient's nose, and, as is too often the case, causing all the symptoms of strangulation.

The circumstances and surroundings in which most of my cases were placed are, I think, the most favorable in some respects that can be attained. With a few exceptions, twenty in all, my patients were adult females of the upper classes, prepared for operation in a private hospital, and the ether was given in the patient's own bed.

In my own experience, the better educated and the more intellectual people are, the more confidence they have in the anæsthetist, and confidence goes a long way in keeping up one's courage when one feels one's self gradually passing into the realms of unconsciousness. This favorable element, however, was offset to a great extent by the large proportion of extremely nervous people met with among those requiring gynæcological operations, people who easily lose control of their actions and emotions. It must not be understood that all cases are as easily managed and go under ether as readily as described; a great many nervous people, who have "screwed their courage to the sticking point," lose all control of themselves after the administration has once actually begun and commence to either struggle or scream or more often to do both before they have had more than a few whiffs of ether. With these the proper plan is to at once remove the inhaler altogether and state plainly that you cannot proceed until quiet is restored, at the same time assuring the patient that if your instructions with regard to taking the ether are adhered to there will be no necessity for any screaming or struggling, but that she will drop off to sleep quietly; and then on recommencing the administration there is no further trouble. This plan answered ten times in the last 100 of my cases and failed but once, and I believe a possible explanation of the change in the patient's behavior is this: that the fear, or whatever emotion caused the excitement, is replaced by indignation at the

anæsthetist's supposed want of sympathy with one who, in all probability, has been doing her best to control herself. The fact that the most of these patients on recovering from the anæsthetic expressed themselves as indignant at the manner in which they were treated bears this out. In other cases, again, control is lost just before the stage is reached at which it is possible to push the ether more rapidly, and two or three breaths then serve to quiet all struggling.

Of the two cases in which I failed to produce anæsthesia without struggling, I endeavored three times in one, by abruptly ceasing the administration and waiting until I could get rational answers to my questions before going on, to do without restraint, but failed. In the other, the patient informed me that she had taken ether several times, and always "screamed herself off," so I made no attempt to combat her resolution.

It occasionally happens that a state of tonic contraction or spasm of the whole body comes on along with full anæsthesia instead of the usual relaxation. This occurred thirty-four times, or in 11 per cent. of the cases.

An explanation of this I am not prepared to give, but it may be noted that when the anæsthesia ordinarily is not yet quite fully established, and also when it is commencing to pass off, there is almost always found to be exaggeration of the patellar reflex and ankle and rectus clonus. And, moreover, clonic contractions of an individual muscle or limb tend to become general in character; thus elevating the leg by placing a finger under the heel often sets up a fine tremor of the whole limb, and tapping the triceps tendon in the arm brings out the same phenomenon in that member. In the same way spasm of the glottis, due to the direct irritation from ether vapor, may, during a late stage in the production of anæsthesia, spread from this as a centre over the whole body and cause general rigidity. Quite apart from this theory as to its cause, the fact has been noted that this condition of spasm is more apt to occur in those subjects exhibiting greater irritability of the mucous membranes to ether vapor. Added to this is the fact that pushing the ether does not overcome but prolongs the rigidity, whereas withdrawing it altogether soon brings

about relaxation of the muscles without return to consciousness. This point was determined experimentally in half a dozen cases by pushing the ether, or at least not decreasing the proportion of vapor breathed, for from twenty to twenty-five minutes, and in all cases the rigidity persisted until the ether vapor was either wholly withdrawn or greatly diminished in strength. Hence the proper procedure on the occurrence of spasm is to discontinue the administration until it passes off, and begin again with a lessened percentage of vapor. It very rarely ever recurs.

Very much less ether is required to keep up anæsthesia than to induce it, hence, as soon as the patient becomes fully anæsthetized, the indicator is allowed to point midway between 1 and 2, and one inspiration of pure air given to every two from the bag; and, as time goes on, the proportion of ether is decreased and of pure air increased. In the majority of cases full anæsthesia is reached when the patient is breathing from 50 to 75 per cent. of ether vapor in the air,—that is, with the indicator between 2 and 3. The percentage reached is higher in winter than summer, owing to the slower rate of evaporation at lower temperatures.

In most forms of the inhaler there is a closed water-chamber below the ether reservoir, and by standing the cylinder for a few minutes in hot water this can be heated sufficiently to warm the ether vapor in cold weather.

The Length of Time Required to produce Full Anæsthesia.—

In considering this point the time is calculated from the moment the inhaler is applied to the patient's face until full anæsthesia is produced. The average time for the whole 300 cases is 4.8 minutes, the longest being twelve minutes and the shortest two minutes.

Thus in 62 per cent. of the whole number the time required was under five minutes, and in 80 per cent. under six minutes. These figures do not represent the actual time elapsing in producing anæsthesia while the patient is breathing the ether, but include all those cases in which, as before described, the administration was temporarily ceased. Undoubtedly if screaming and struggling were ignored and the anæsthetic pushed, as in dealing with children, the average time would be shortened considerably.

I have been unable to obtain any exact statistics of the time required in other forms of inhalers, but from my own experience I judge it is considerably shorter on the average with the Clover than with the others. Of the causes tending to prolong the time beyond the average the chief one was loss of control on the patient's part, as already referred to; another, difficulty in getting the patients to breathe properly, owing to their timidity; and lastly, a badly-fitting face-piece, which allowed air to enter between it and the face, so that very little of the respired air passed through the ether-vessel. This can be guarded against by having several different sizes of face-pieces, and by allowing sufficient air to escape from the air-cushion so that it adjusts accurately to the face when pressed down.

The following table (No. I) shows the details:

TABLE I.

Two minutes and under three	. . . . .	6 = 2 per cent.
Three " "	four	60 = 20 "
Four " "	five	118 = 40 "
Five " "	six	58 = 20 "
Six " "	seven	19 = 6 "
Seven " "	eight	16 = 5 "
Eight " "	nine	10 = 3 "
Nine " "	ten	2
Ten " "	. . . . .	7
Eleven and twelve minutes	. . . . .	4

The Amount of Ether consumed.—This is obtained by comparing the average time under anæsthesia with the average amount of ether used. The time is reckoned from the moment the inhaler is first applied to the face until the administration is stopped, although the anæsthesia lasts for a variable length of time after this. The average length of administration was eighty-seven and a half minutes, and the average of ether forty fluid drachms for the 280 cases of which I have notes; or, in round numbers, five fluid ounces of ether, or about the amount in an ordinary 100-gramme tin, sufficed for an administration lasting an hour and a half. The amount varies relatively in inverse proportion to the length of administration thus, for those operations lasting three hours or over, ten in all, the average amount of

ether used in an hour and a half was only twenty-eight fluid drachms as compared with forty. About four fluid ounces, as a rule, should be allowed for the first hour, two and a half for the second, and so on in proportion. There is, too, roughly speaking, a direct proportion between the body weight and the amount of ether used, but this is often disturbed by other causes of which, perhaps, individual idiosyncrasy is the prominent one. Anæmia appears to be a factor tending to diminish, and plethora one tending to increase the amount necessary to keep up anæsthesia.

Vomiting During the Operation.—This occurred seventeen times, or in 5.6 per cent. of the cases. Its occurrence, though of little moment in the majority of surgical operations, often greatly increases the danger of spreading infection where there is a localized collection of pus within the abdomen. The determining cause in many of these cases could not be satisfactorily fixed; in one or two it was partial recovery from anæsthesia through faulty administration, in others I fancied that swallowing air before almost every breath, while going under, accounted for it.

After Vomiting.—This is the point on which I have obtained the least satisfactory results. Nausea or vomiting occurred in 90 per cent. of all cases. Several of the methods recommended for modifying this untoward effect of ether were tried, but without success. Atropine, either alone or with morphia, was tried both hypodermically and by the mouth, but without satisfactory results; and, besides, it disguised the real condition of the patient by its influence on pulse, pupils, and respiration. For this reason, as will be shown in speaking of pulse and respiration, I consider it is contraindicated. Possibly the relatively long duration of the series of cases under discussion in this paper as compared with operations in general may account for the large amount of after-sickness noted.

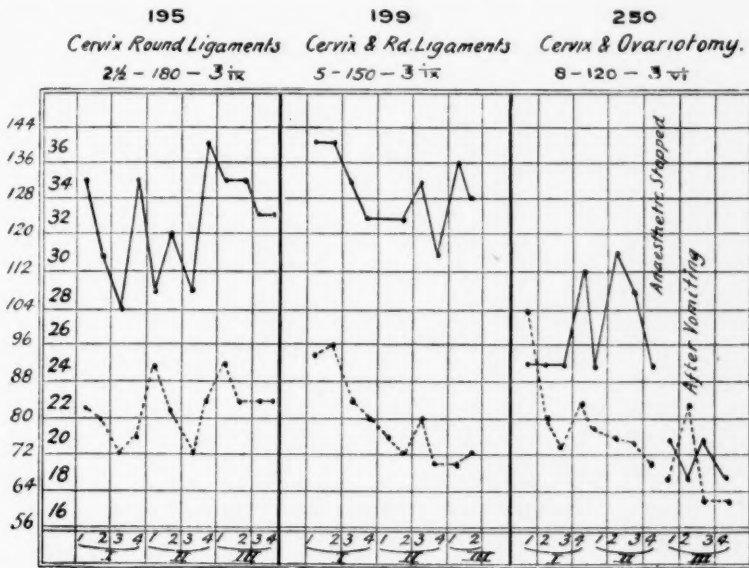
Pulse and Respiration.—Plastic operations certainly give one the best opportunity of investigating clinically the effect of ether upon the pulse and respiration. In a case, for example, of repair of the perineum, where there has been normal temperature, pulse, and respiration, and where the operation itself does not produce any shock from hæmorrhage or other cause, all changes in these

must be due entirely to the ether inhaled. In order to determine as far as possible the usual effect and to detect any causes tending to alter this, the pulse and respirations were taken every fifteen minutes throughout the anæsthesia in 100 cases; and in a large number of these, for the hour following also. From the data thus obtained are prepared pulse-respiration charts, the ratio being the usual one of four to one. As the pulse is usually extremely rapid at the outset, from the excited condition of the patient, the first time recorded is at the end of fifteen minutes, marked on the chart as 1; 2, 3, and 4, thus representing the half hour, three-quarters, and hour, and so on for the other hours.

The general course of the pulse shows an initial rise above the normal of from thirty to seventy beats a minute, caused by the excitement and the stimulating action of the drug; then a gradual fall amounting to twenty or thirty beats by the first quarter and continuing, so that at the half or three-quarters it has reached the rate normal to the individual, at which it remains. The respirations are also at the outset greatly increased, but they do not fall with the pulse and do not come down to the normal rate, while the ether continues to be inhaled; thus the pulse-respiration ratio is altered from four to one, to three or two to one. The rate of respiration is usually between twenty-four and thirty-six, but it is liable to rapid alterations.

Now the question arises, whether we can lay down any fixed rule for the pulse and respiration rate, and the ratio between the two, of practical value, so that variations from this may be accepted as evidence of some cause, acting either in the way of faulty administration or in the operation itself, which is affecting the patient's condition. I think we can, but before discussing the subject it is necessary to refer again to the inhaler, with which, as previously stated, the strength of ether vapor inhaled can be regulated at will by the anæsthetist. It is claimed by some writers, however, that a definite proportion of the effect produced in this method of administering ether is due to the production of a certain degree of asphyxia by breathing over again already respired air along with the ether vapor, and it is this point I will

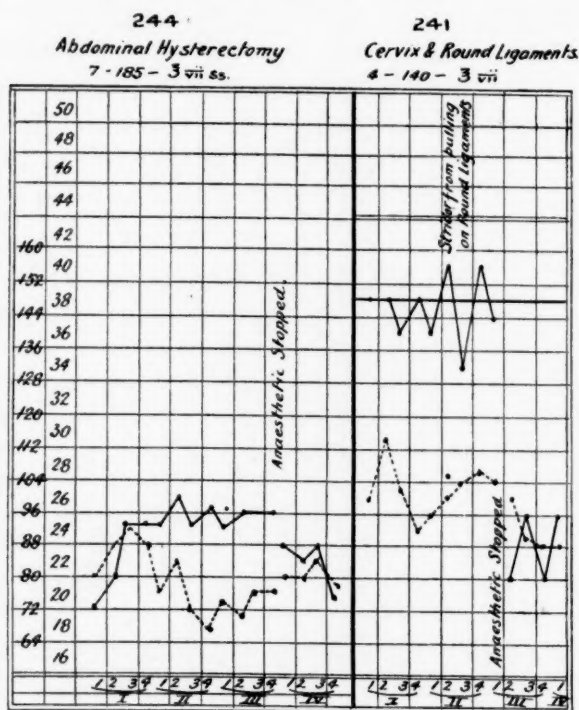
now consider. I admit that the production of anaesthesia by this method is due to ether plus a certain amount of asphyxia; I hold, however, that the method of giving the ether followed after anaesthesia has been set up, practically eliminates entirely any element of asphyxia then. It was in this order: one inspiration and expiration of air, inspiration of air, expiration into the bag, inspiration from and expiration into the bag, and so on over again. Thus, in every three respirations, two inspirations were of air and one from the bag, and in other cases, in every four breaths, two



were of air; moreover, the air in the bag is replenished each time by an expiration containing the amount of pure air in the respiratory passages at the end of inspiration, as this must first be driven out before the foul air from the lungs can follow it. The air in the bag is thus diluted with a certain amount of good air before it is drawn into the lungs, and as at least half of all breaths are pure air and the breathing is double the normal rate, the degree of asphyxia must be practically *nil*. I have, too, in a measure, tested the matter practically by comparing two series of ten administrations each, of which the aggregate time in

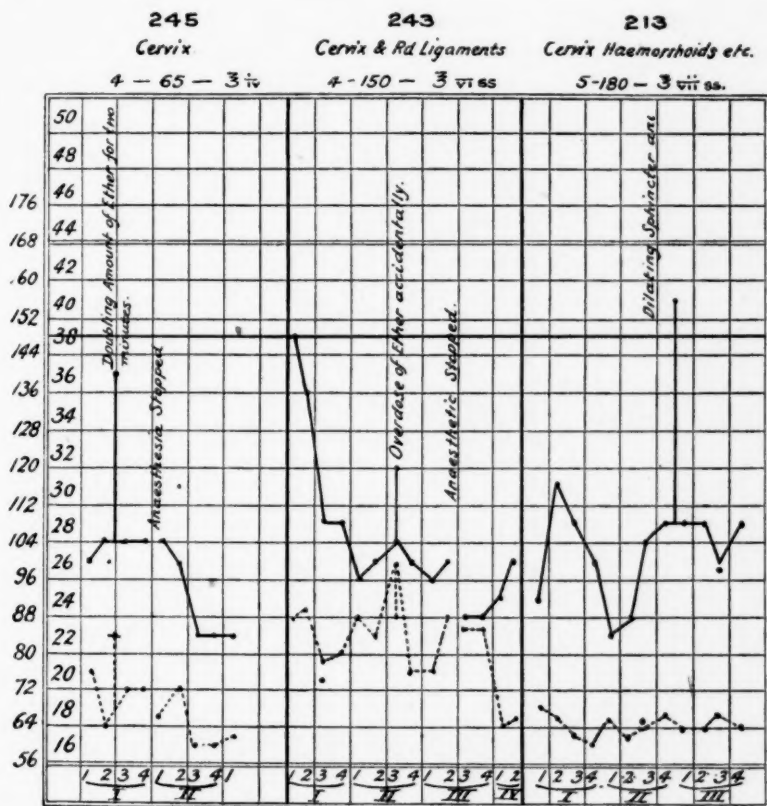
both was the same, in one series the ether was given in the ordinary manner, in the other with much less pure air, and there was only the difference of a couple of drachms between the amounts of ether used in each series.

Purposely taking a class of cases in which we may reasonably expect the nature of the operation to have little effect upon the condition of the patient, and selecting from among these the ones in which the anæsthesia was kept up for the longest period,



we find, in cases 195 and 199, lasting three hours and two hours and a half respectively, that the pulse does not become faster as the time progresses, but remains at about the normal. The respirations vary between twenty-eight and thirty-six, but evidently the variations do not correspond with those of the pulse. Chart 199 shows, moreover, the gradual fall, as described, at the beginning of the administration; and both show the alteration in

pulse-respiration ratio. In Case 250, where the abdominal cavity was opened, and hence the operation was of a more serious nature, the pulse chart shows the same general course and the respirations are also increased, and the pulse-respiration ratio altered. As soon as the ether is stopped, however, the normal ratio is re-established. I have, besides the ones shown, twenty-five



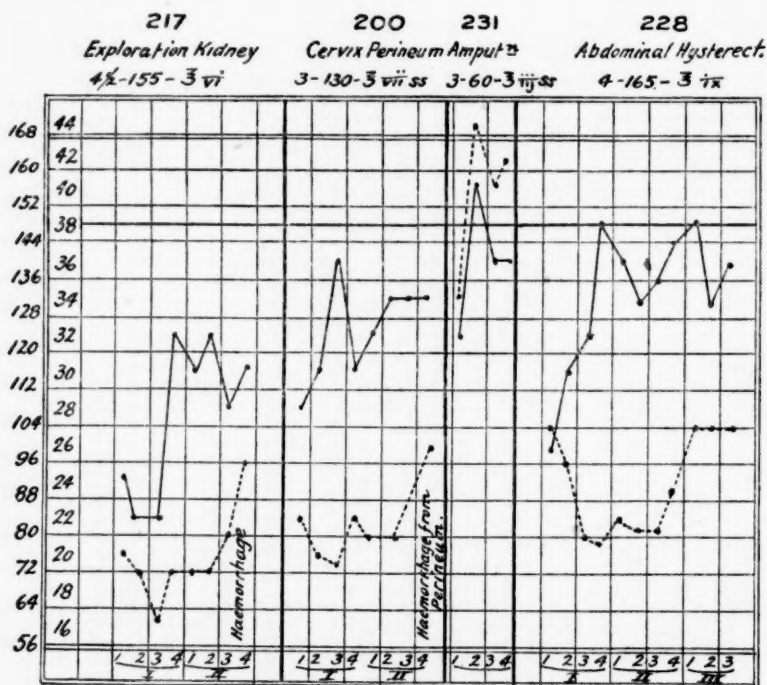
similar charts, all showing the fall in the rate of the pulse at the outset, and then no further tendency to rise above normal limits.

Case 244, although a very serious operation,—viz., total extirpation of the uterus, in which the anæsthesia was kept up three hours and the abdominal cavity was open for over two,—shows no rise of the pulse above 92, and at the end of the three

hours it was 76, and full and strong in character. Case 241, again, appears to be due to an individual peculiarity of which I will have something to say later.

Another series of charts shows changes due to various causes. These are,—

(1) Changes, both in pulse and respiration, from an overdose of ether,—*i.e.*, more than is required to keep up surgical anæsthesia.

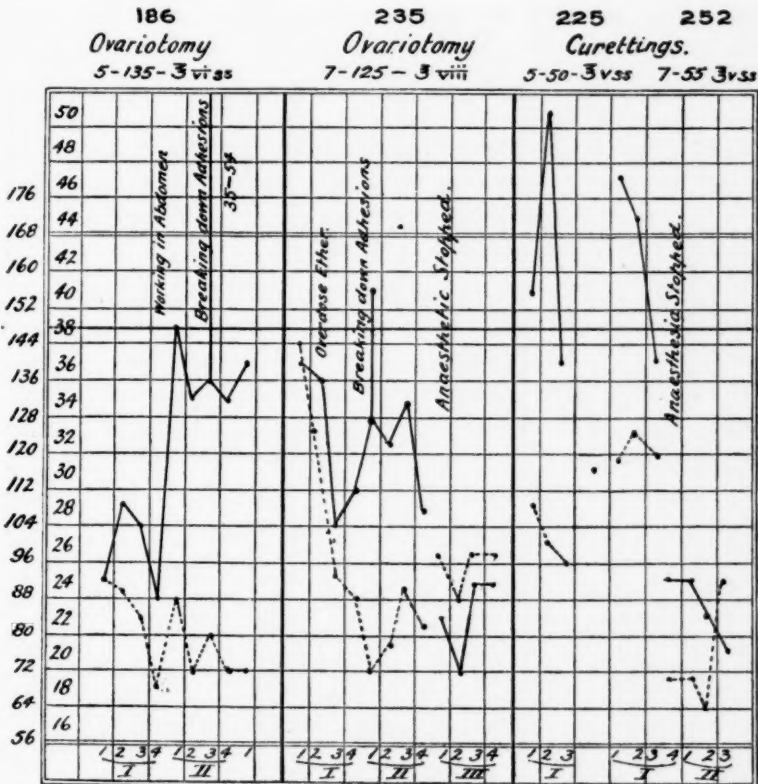


(2) Changes in the pulse from loss of blood.

(3) Reflex quickening of the respirations from various manipulations on the part of the operator.

The effect produced by an overdose of ether was obtained experimentally as follows: With the breathing and pulse at what was the best obtainable for each individual case, the strength of ether vapor was doubled, but given with exactly the same proportion of pure air, in ten cases, and the results noted. These

were: a sudden rise in the rate of respiration of from 10 to 14 per minute with stridor and labored breathing; a less marked rise in the pulse-rate of from 12 to 20 beats; and dilatation of the pupils. On allowing the patient to breathe pure air for a short period almost as sudden a return to the former rates was noted. See Cases 245, 247, and 248, which explain themselves. Experi-



ments of this nature can, of course, only be carried on within very narrow limits, but enough has been shown to prove that an overdose of ether can cause an alarming change in the condition of the patient, and so lessen the resisting powers. Acting on the knowledge gained through this experiment, I have several times been able to detect an overdose in my own cases, and, by

decreasing the strength of ether vapor, to better the condition of the patient. Case 243 is one of those alluded to.

The effect of hæmorrhage is shown in Case 217, where an unusually slow pulse rises from 72 to 96 from free bleeding from an incised kidney; and in Case 200, where there was smart hæmorrhage from the perineum. In both of these cases, and in others to be referred to, the possibility of the effects noted being due to an overdose of ether was first considered and tested. Case 231 shows an extremely rapid pulse-rate, the relative position of pulse and respirations having changed. The case was one of amputation of the thigh in an old woman weakened by sup-puration of a joint. The pulse-rate before operation was for days over 120, and there was considerable pyrexia. There was no loss of blood, and the case did well. I introduce it here to show that any observations forming a basis for generalizations must be made on subjects who are in normal health at the time of operation.

Another series of cases shows the effects produced upon the respiration by various manipulations on the part of the operator. In almost all articles upon anæsthesia one sees the statement made that a much deeper degree of anæsthesia is required for operations upon the perineum and rectum than in other cases. The reason for this opinion is evident. Reflexes persist from these parts when all others are abolished. These reflexes, however, I can show, affect only the breathing, and not the general condition of the patient. The manipulations which affect the breathing are, stretching of the sphincter ani and working with the mucosa of the rectum, rough handling of the peritoneum, and especially breaking down peritoneal adhesions, compression or rough handling of the ovaries and testes, and stretching of the perineum. The latter is not so invariable as the others. Take, for example, Case 213. Here, with respiration 38, pulse 66, dilating the sphincter ani caused a sudden rise to 40 of the respirations, with marked stridor, and no change at all could be detected in the pulse or pupils. This observation has been made over twenty times. The same thing is seen in Case 248. Case 186 shows the effect of breaking down peritoneal adhesions. Although the respirations shot up at once when tearing away the

ovaries from firm adhesions was commenced, the pulse continued to fall gradually, and at one time, when the respirations rose to 54 from 35, there was no change noticed in the pulse or pupils. Case 235 shows a similar case, and also the accidental occurrence of an overdose of ether at the half hour. After the anæsthesia was stopped the respirations fell to normal, and the pulse went up a little. Although these reflexes were present in all cases tested, the intensity of them varied very much.

Some individuals show a special susceptibility to the action of ether in the form of an extremely sensitive respiratory mucous membrane, which is intensely irritated by even a very low percentage of vapor. The respirations are very rapid in these cases, and the slightest increase in the strength of vapor causes coughing even under deep anæsthesia. Case 228, total extirpation of the uterus, is one in which this was present to a moderate degree. The pulse rise shown towards the end of operation appeared due to the high rate of respiration, as there was nothing else to account for it. This case was very similar to No. 244, already referred to, where we have a very different tracing both of pulse and respiration. In Cases 225 and 252 this idiosyncrasy, if such we may call it, was present to a marked degree. They show two administrations, at an interval of two months, to the same patient; and here there was the condition described, and although every means was tried in the way of regulating the amount of ether vapor exhibited, it was found impossible to keep up the anæsthesia without causing the high respiration and pulse-rate shown. Almost immediately after ceasing the administration, however, the pulse and respirations are seen to have come down to normal.

The Character of the Pulse.—On placing the fingers on the radial artery during ether anæsthesia, one notices that there is something peculiar in the character of the pulse-wave, the tension seems to be rather high and sustained, and yet there is not the sensation of a forcible rise and slow and gradual fall given by the ordinary high-tension pulse. The cause of this peculiarity is shown in the following sphygmograms, which were taken at intervals during the anæsthesia by Dr. Kenneth Cameron and myself. The tracings were made by the Marey sphygmograph

vomiting, in the hope of getting rid of some of the mucus by that means.

Sphygmogram *A* was taken at the half-hour. A few minutes later the ether vapor was doubled in strength, and given thus for two minutes when *B* was taken. The pulse is seen to have risen

247 *A.*247 *B.*

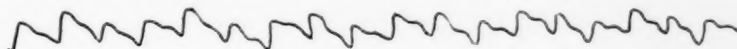
18, the respirations 8 to the minute, and the pupils became widely dilated. The apparent irregularity of the pulse is probably due entirely to movements of the patient's arm caused by the deep respirations. The character of the pulse-wave is not changed.

247 *C.*247 *D.*

C, *D*, and *E* were taken at three-quarters, one, and one and a quarter hours. *C* shows that the effect of the overdose of ether given at *B* has passed off.

247 *E.*

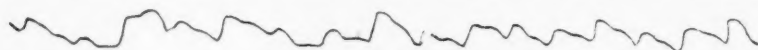
F was immediately after retching had been induced by stopping the ether. As no breathing occurred during the attempts at vomiting, there was considerable blueness of the face and increase in the pulse-rate. Besides the irregularity due to labored breath-

247 *F.*

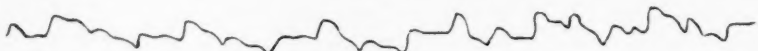
ing, note that the upward stroke of the lever is almost straight, as compared with the oblique or curved rise shown in the others.

In *G* and *H*, taken one and a half and one and three-quarters hours, the breathing was choked and labored from the mucus in

the throat. The patient was being drowned in her own secretions. As the mucus was out of reach of a sponge passed into the



247 G.



247 H.

throat, vomiting was again induced, and this time a considerable amount expelled.

K is taken from the same patient ten days after operation, and shows a moderately high-tension pulse.



247 K.

CASE 248. *Operations upon the Cervix and for Hæmorrhoids.*—The pulse-respiration chart shows an average case with the usual reflex quickening of the breathing. There was no mucus.



248 A.



248 C.

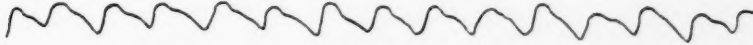
A and *C*, the half and three-quarters hour, show the same general character found in all the tracings taken under ether. The ascent is curved, the lever at first rises rapidly, then more slowly, and does not reach its highest point until one-quarter of the whole time occupied by the beat has passed. The descent is just as gradual, with a barely perceptible pause in the fall representing the dicrotic wave.



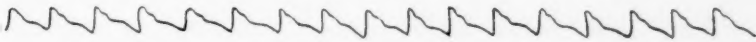
248 D.

D, taken after two minutes of double the usual dose of ether, shows the alternate beats large and small. Here exactly

the same effect was observed as in 247 *B*. The rise in pulse-rate is 14, and in respirations 13 to the minute.

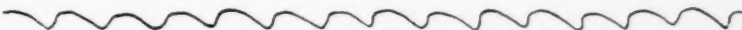
248 *E*.248 *F*.

E and *F* show the pulse-wave at one and one and a quarter hours to be exactly similar to those taken earlier in the operation.

248 *G*.

G was taken the day following the operation, and the straight, almost vertical ascent with immediate fall and dicrotic and pre-dicrotic waves are in sharp contrast with the same pulse under ether.

CASE 249, *Plastic operations on the cervix and of vagina*, shows five tracings taken at quarter-hour intervals, beginning at the three-quarter hour.

249 *A*.249 *B*.249 *C*.249 *D*.249 *E*.

There was the same difficulty with stiff mucus in the throat in this case as in No. 247. The curve in the first three tracings is simply a gradual rise and somewhat more gradual fall. The other two resemble the other cases, but there is no trace of the dicrotic wave in any of them.

CASE 250. *Cervix and Ovariectomy*.—The first tracing was taken fifteen minutes after the ether was stopped and the second twenty-four hours later. In the first, the curved ascent as seen under ether has already begun to pass off, but the highest pressure is maintained for nearly half the beat, and there is no dicrotic wave. The second is a normal tracing.

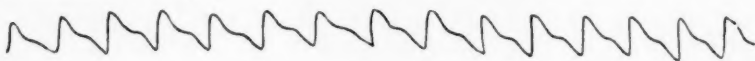


249 F.



250 A.

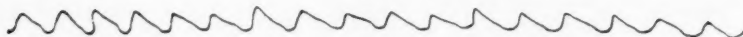
CASE 251. *An Operation for Hæmorrhoids in a very Anæmic Girl*.—The three-quarter-hour tracings, A, B, and C, resemble No. 248.



250 B.

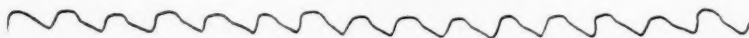


251 A.

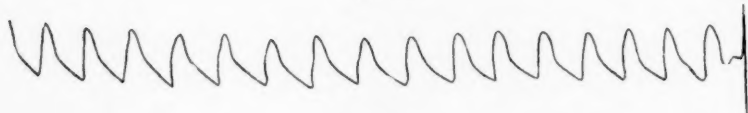


251 B.

D, taken three days later, shows a moderate tension pulse met with during fever, which is here seen to be 99.4° F. The absence of any dicrotic wave is remarkable.



251 C.



251 D.

The series of sphygmograms shown are not selected, but are taken from five consecutive cases. They all show the same general character, and are, as far as I know, totally unlike those obtained during health or in disease. The chief points of dif-

ference are the entire absence of straight lines and sharp angles, and the more or less complete obliteration of the dicrotic wave. In the present state of our knowledge the exact conditions of the circulation, which this form of sphygmogram denotes, cannot be positively stated. I am inclined to attribute it to high arterial tension with a slowly-acting heart. The absence of the dicrotic wave points to high tension and to that increased blood-pressure which has been shown to be present during the inhalation of ether. The curved ascent of the wave, I think, is best explained by a slowly-acting ventricle, which, on purely theoretical grounds, one would be inclined to expect under deep anæsthesia. Whatever the explanation, the state of the circulation under ether anæsthesia is shown to be profoundly modified.

The practical points suggested by the consideration of this part of the subject are these :

(1) That there are certain reflexes, present during full surgical anæsthesia, which manifest themselves by increasing the rate and the depth of the respirations.

(2) That the production of these reflexes does not affect the pulse, pupils, or general condition of the patient.

(3) That during their occurrence the amount of ether being inhaled should be temporarily diminished ; as the increased frequency and depth of respiration would otherwise lead to an overdose being exhibited.

(4) That the pulse and respiration, if watched from the outset, are a valuable indication of the degree of anæsthesia present ; and that quickening, especially of the respirations, denotes an overdose of ether unless it is accounted for by the reflexes mentioned or by interference with the breathing from the presence of mucus in air-passages.

(5) That quickening of the pulse alone denotes hæmorrhage.

The Condition of the Pupils.—The pupils are usually moderately contracted and react actively to light, there are, however, noticeable variations in size from time to time which cannot be easily accounted for. An overdose of ether causes wide dilatation and partial loss of the light reflex ; a partial degree of asphyxia, from the admission of too little pure air, causes fine con-

traction. It is not uncommon to find the pupil which has been frequently examined smaller than the other; the repeated exposure here causes a certain amount of permanent contraction. I strongly deprecate the practice of repeatedly testing for the presence of the corneal reflex; it is rarely necessary to do so more than once, and often I omit it altogether. The rate and especially the character of the breathing are a reliable index to the occurrence of full anæsthesia, even at the outset of the administration; and after that, as has been already shown, they are the best evidence to go by.

The Reflexes.—I have not as yet collected sufficient data on which to base any general statement. There appears, however, to be a period, during the production of anæsthesia, in which the knee-jerk is increased and ankle clonus is present. As I insist on absolute quiet and non-interference with the patient during the production of the anæsthesia, the reflexes were not examined until the breathing denoted insensibility. Similarly there is a period during recovery in which there is increased knee-jerk and ankle clonus.

Reflexes during deep anæsthesia, as before described, are obtained from the anus, rectum, ovaries, testes, perineum, and peritoneum.

Secretion of Mucus in the Respiratory Tract.—The collection of a large amount of sticky mucus in the larynx and pharynx during anæsthesia very often seriously interferes with the breathing, especially where the nature of the operation necessitates the supine position. In 7.5 per cent. of the cases I noted the presence of mucus in sufficient quantity to cause some difficulty. Its removal is usually readily effected by a small sponge fixed on a holder thrust into the pharynx; where this fails, it is well to have the patient recover sufficiently to allow of vomiting being induced by tickling the pharynx with the sponge. The act of vomiting forces the mucus out of the upper part of the trachea and larynx, and it can be induced before the patient has regained consciousness.

Before leaving this part of the subject, let us contrast this, which I will call the rational method of ether administration, with

that in general use. I contend that ether, like all other powerful drugs, should be given in doses just sufficient to bring about the required result, and no more. How do we attain this in other cases? The maximum and minimum dose has been determined, and in giving a drug we use our judgment with regard to the first dose, and alter this to more or less according to the result obtained. It is hardly necessary to point out that no data on which to base the strength of subsequent doses can be obtained unless the amount actually taken into the body is known. When one, wishing to produce a definite physiological action by a certain drug, orders an ounce of it to be taken in a wineglass of water, and returns the following day to find that an unknown proportion was spilt in the act of administering it, one has absolutely no data on which to base one's further procedure in the case; unless the desired action is already present, and then the only knowledge gained is that something less than the ounce was sufficient to produce it, but whether just enough or more than was necessary has been taken, it is impossible to tell. Now this represents fairly well what occurs when ether is administered by those forms of inhaler which consist essentially of a sponge, gauze pad, or other means of holding the ether with a more or less accurately-fitting mask; the commonly-used "cone" is the best known type. No attempt is made or can be made to measure the actual amount of ether inhaled, and it is wellnigh impossible to regulate the strength of vapor, owing to the extremely volatile nature of the drug. The amount "spilt" on expiration must be very large, but is always an unknown quantity, consequently, although the administrator acquires by long experience a certain degree of exactness in determining the amount of ether to keep pouring into the inhaler, he is never able to tell what proportion of this the patient has actually inhaled, and the most he can do is either to continuously exceed the necessary amount or to run the risk of frequently having the anaesthesia partially pass off. But, as I have shown, by using Clover's inhaler the anaesthetist can measure the amount inhaled, and can regulate the further administration in exact proportion to the effects produced.

There are three principal points to be considered in discussing the advantages of any inhaler; its safety, the patient's comfort, and the administrator's comfort. With regard to the first of these, we are here able to give the minimum dose necessary to produce the required effect, and the pulse-respiration charts are evidence of the patient's condition. The extremely slight liability to vomiting on the operating table is also important, as a large percentage of the fatal results recorded have been due to this cause. That the patient's comfort is considered is seen in the absence of struggling during the administration, and in the preference expressed for this inhaler by those who have tried others. It is a most significant fact, too, that where there had been no previous experience of other inhalers, I rarely had any trouble in giving the ether, and never in repeating the administration after once using this one. In considering the administrator's comfort, it must be remembered that in profound anæsthesia, a state but little removed from death, constant watchfulness is essential to detect any dangerous symptoms. The state of the respiration has been shown to be the most reliable evidence of the patient's condition, and with this inhaler we have the means of accurately observing this. The filling and collapsing of the bag show the actual amount of air entering the lungs, and the noise produced by the breath in passing through the ether reservoir enables the ear to detect the slightest obstruction to the breathing or alteration in its character. This, too, is an additional element in regard to its safety. Other advantages are, rapidity in the production of anæsthesia, the small amount of ether used, and the relatively slight escape of ether vapor into the room. I do not claim that, with statistics of only 300 cases to draw from, the dose can at present be positively stated, but I do think that by careful observation, and the collection of a large number of cases, we will yet be able to fix the dose for the required time, and administer it in a rational manner. May it not be that failure to recognize the existence of those respiration reflexes, before described, has been in a considerable measure accountable for the increased risk attending anæsthesia in operations on the rectum and anus? The administrator, considering the quickening of the breathing

to show partial recovery of the patient, increases the amount of the anæsthetic given, and this is taken up quickly, owing to the increased depth and rate of respiration, and leads to an overdose, which, in chloroform especially, is so often followed by fatal consequences.

The Urine.—The effect produced by ether anæsthesia upon the secretion and composition of the urine was arrived at by the following method of investigation. Examinations were made of—

(1) A specimen of urine obtained just before commencing the administration, designated "*ante*" in my notes.

(2) The urine secreted during the anæsthesia, drawn off by catheter immediately after ceasing the administration, and before the patient had been removed from the operating table, designated "*post*."

(3) One or more specimens obtained from twelve hours to five days after the operation, and designated by the number of hours after.

The *ante* specimen was examined as a control for those cases in which abnormal constituents were found *post*.

For the *post* the points recorded are : amount, odor, specific gravity, presence of albumen, acetone, sugar, and the total amount of urea in grains. The other specimens were treated more especially for albumen, sugar, and acetone.

The following tests were made use of :

Albumen.—Overlaying cold nitric acid with the urine. Boiling of the upper portion of urine in a small calibre test-tube with the subsequent addition of nitric acid. Where present, the quantity was estimated by Esbach's albumenometer.

Sugar.—By freshly-prepared Fehling's solution.

Acetone.—By testing the distillate with Lieben's iodoform test. A practical difficulty experienced at first in making this test is worth noting. I found that in distilling one specimen containing acetone, a considerable quantity of it had lodged in the tube (worm) of the condenser, and was carried over with the next distillate. This was overcome by drawing off the cold water from the condenser, and passing steam through the tube after each distillation.

Urea was estimated with the ureometer of Doremus, by the decomposition of sodium hypobromide.

Deposits.—By the microscope and chemical tests.

The amount of *urine secreted* while in a state of anæsthesia was 256.85 fluid ounces in 100 cases, lasting 9130 minutes,—that is, 2.5 ounces in an hour and a half, or at the rate of 40.5 ounces in twenty-four hours. This is within the average normal amount. It is found, too, that the amount varies with the length of the anæsthesia, becoming relatively less as the time is lengthened thus.

TABLE II.

29 cases lasting one hour or under, averaged	. . . 2.6 ounces per hour.
50 “ between one and two hours “	. . . 1.9 “ “ “
30 “ “ two and three hours “	. . . 1.42 “ “ “

The amount secreted depended largely too upon the character of the ante specimen; thus, in extremely nervous patients and where there was a large amount of ante of low specific gravity, the post was of similar character. There was no instance of entire suppression, but in two or three cases, where the anæsthesia lasted between one and two hours, only a couple of drachms was obtained, in these, however, it is probable that the bladder was not properly emptied at the time. Later experience showed that, unless pressure is made over the bladder above the pubes, a portion of the urine may remain in the organ even after catheterization.

The total amount of *urea* in the same 100 cases was 1122.8 grains,—that is, at the rate of 177.08 grains *per diem*,—about three-eighths of the normal amount. As one would expect, there is a gradual diminution in the amount secreted as the time passes; thus long anæsthesias show a smaller amount per hour than short ones. This fact is well shown by the table given (III), and also by the following case: No. 241, duration 135 minutes. At the end of 60 minutes $1\frac{3}{4}$ ounces of urine were drawn off, and found to contain 9 grains of urea; 75 minutes later, 2 ounces more were obtained; but, although the interval was longer, and the quantity proportionately increased, there was only 7.2 grains of urea present.

TABLE III.

29 cases, one hour and under,	averaged . .	10.75 grains per hour.
50 " between 1 and 2 hours,	" . .	7.34 + " " "
20 " " 2 " 3 " " . .		5.68 + " " "

Albumen was detected *post* in 7 of 100 cases, in which it had been absent *ante*; and it disappeared again within 48 hours in every case. The cases are given in detail.

No. 122. Anæmic woman, blood-count showing 3,800,000 red and 37,600 white per centimetre. Duration of anæsthesia 120 minutes. Operation on cervix and ligaments. Urine, *post*, three fluid ounces, acid, clear, uric acid sediment; contains 16.5 grains urea and albumen, one-eighth bulk on boiling with nitric acid; 24 hours later only a slight trace of albumen was present, and 48 hours, no albumen.

No. 127. Same patient, twelve days later, duration ninety minutes. Operation on perineum. Urine, *post*, 3.5 ounces; again containing albumen, one-tenth bulk, which disappeared by the second day.

No. 134. Total extirpation of the uterus. One hundred and sixty minutes. Urine, four ounces, contained a trace of albumen; not present the following day.

No. 141. Operation on perineum, 130 minutes. Urine, 5.5 ounces, contains albumen less than 1 in 1000.

No. 185. Total extirpation of the uterus, 225 minutes. Urine, 2.25 ounces, contains a trace of albumen.

No. 190. Operation on the perineum, 160 minutes. Urine, three ounces, contains albumen less than 1 in 1000. Esbach: Twenty-four hours later, no albumen present.

No. 228. Total extirpation of the uterus, 165 minutes. Urine, one ounce, contains albumen 2 in 1000. Esbach: This had disappeared in a couple of days.

In all the above cases microscopical examinations were made of the sediment, but no casts or other evidences of renal disease were discovered. It is to be noted that three of the above cases were total extirpation of the uterus in which a sound was introduced into the bladder during the operation. In a large number of cases a trace of albumen was found the second or third day after

operation, due to the vaginal discharge. The small amount and transient nature of the albuminuria present in these cases, together with the absence of any signs of renal disease, plainly show it to have been due to changes in the circulation at the time.

The presence of *acetone* was not suspected at first, and consequently not looked for until discovered accidentally. Then seventy-five consecutive cases were examined, and it was found in all within twenty-four hours after the anæsthesia. Table IV shows the percentage of cases giving acetone at various intervals after anæsthesia.

TABLE IV.

<i>Post.</i>	58 tested.	Acetone present in 37 = 64 per cent.			
24 hours.	54 "	"	"	" all = 100	" "
48 "	17 "	"	"	" all = 100	" "
72 "	20 "	"	"	" 17 = 85	" "
96 "	9 "	"	"	" 6 = 66	" "
120 "	5 "	Slight trace in		3 = 60	" "

Acetone is thus seen to be a constant product of ether anæsthesia, but I think of little or no clinical significance.

A decided *odor of ether* was noticed in all the *post* specimens, whether acetone was present or not. It was not, however, distinguishable in specimens obtained afterwards, although it remained for weeks in the *post* if tightly corked up. It was probably due to ether excreted in the urine while the body tissues were saturated with the drug. By slowly distilling a number of *post* specimens at a very low temperature, and passing the vapor through alcohol, the alcohol became strongly impregnated with the odor of ether.

Squibb's ether was used in every administration.

EXTRA-UTERINE PREGNANCY AND PELVIC HÆMORRHAGE; CASES AND REMARKS.

By MAURICE H. RICHARDSON, M.D.,

VISITING SURGEON TO THE MASSACHUSETTS GENERAL HOSPITAL; ASSISTANT PROFESSOR OF ANATOMY, HARVARD UNIVERSITY.

AMONG the acute abdominal conditions demanding immediate surgical interference, hæmorrhage, from one cause or another, takes perhaps the most important place. Whether the bleeding is due to faulty gestation or to some other cause, the only possibility of cure in many instances lies in immediately opening the abdomen and in removing the cause of the hæmorrhage. This field is not one limited to the gynæcologist; the emergency must frequently be met by the general surgeon, and at times by the general practitioner, for though this condition is not always rapidly fatal, yet the delay of an hour may place the patient beyond the hope of cure.

Intraperitoneal hæmorrhages are not limited to the female, but in the great majority of cases the cause is to be found in the pelvic organs of this sex, though it does not follow, even if the source is in the tubes or uterus, that the cause is a faulty pregnancy. In some instances the thin-walled vessels about the ovaries or the tubes give way under diseased conditions, and the phenomena of pelvic hæmorrhage ensue. For all practical considerations it makes no difference whether this hæmorrhage starts in an ectopic gestation or whether it comes from some other pathological cause. A hæmatosalpinx that is not associated with pregnancy may give rise to as rapid and as fatal symptoms as a ruptured extra-uterine fœtal sac.

Intraperitoneal hæmorrhage, in most instances, is slow in its progress; in some cases, however, the course is fulminating and rapidly fatal. Twice in my own experience an hour has

been long enough to place the patient in a hopeless collapse. In one case I saw, for the first time, at one o'clock, a woman in whom there was no suspicion of hæmorrhage or any other acute condition; at two o'clock she was pulseless. She lived during the afternoon and night, but at no time was her condition good enough to justify interference. In other cases the progress of the hæmorrhage has been slow, and I have had sufficient time not only to study the case but to apply the surgical remedy. At times the hæmorrhage is distinctly localized, is subperitoneal, and may appear as a small semifluctuating mass in the recto-uterine cul-de-sac. In other cases it is more rapid, but ceases with the formation of a tumor that may be seen or felt above the pubes. Sometimes there are multiple hæmorrhages by which successive tumors are formed in different parts of the pelvis. My first operation in a case of this kind was upon an hæmatocele in the centre of the pelvis, continuous with the fundus. Before the patient was fully convalescent another tumor appeared in the left uterine horn. Later an extravasation took place in the right broad ligament. These successive hæmorrhages, several weeks apart, resembled each other very much. The diagnosis was never positively made, and it is quite likely that in this case (No. XI), which will be given in detail, there was some other cause than a faulty gestation.

In several of the cases there was a history of previous attacks of pain, presumably due to small ruptures which later closed spontaneously.

The mortality in cases of pelvic hæmorrhage depends first upon the amount of blood lost, and, secondly, upon the profundity of the shock. Death due to loss of blood alone is, in my experience, extremely rare. For some reason the extravasations from a ruptured foetal sac are attended by a shock which is out of all proportion to the amount of blood lost. In such instances the patient suffers not only from the loss of blood, but also from the extensive wounding of the peritoneum, the so-called peritoneal shock. In these cases there are not only the signs of hæmorrhage, but also those of great systemic depression. In fatal cases of this kind death takes place in the course of a few

hours. In two that I have seen, the patients have been so nearly dead that I thought the only chance of their recovery lay in the administration of stimulants and intravenous injections until they could stand the brief manipulations for controlling further extravasation. Death followed in both cases. In a third, which was also fatal, I determined to operate even in the face of impending death. In this case the same fatal termination occurred, though not until reaction and general peritonitis had had time to be developed. It is a question, therefore, in considering the mortality of these conditions, whether it is not better to leave the patient alone when in extreme collapse than to take away, by even the slight additional shock of operation, the little remaining chance she may have.

Death impending, shall we operate or not? This question, like similar ones in appendicitis and general peritonitis from other causes, tests the judgment of the operator most thoroughly, and calls for wide experience and knowledge of the highest order. In three instances of collapse from hæmorrhage, due undoubtedly to the rupture of an ectopic sac, this question arose. In the first case there were extreme pallor, restlessness, and dyspnœa, with a rapid and almost imperceptible pulse. Death took place while we were preparing to infuse salt solution. In the second case the patient became collapsed in a few minutes after the rupture of the sac. The pulse was so rapid and so faint that no operation was seriously considered. It is quite obvious that under such conditions the slightest surgical manipulation will be fatal; yet after the patient's death I have at times felt some regret that I had not attempted a rapid abdominal section, on the ground that she could not have more than died, and that she might possibly have been saved. This reasoning, upon which regrets worse than vain are often based, is not only fallacious, but distinctly provocative, in the total, of harm; for from it spring the numerous hopeless operations for all sorts of incurable conditions which bring odium upon surgery and reproach, perhaps deserved, upon the surgeon. Calm retrospect shows, I maintain, that the reasoning in these cases was good, and that the treatment adopted gave the patients their only chance. The only possibility of

cure was to wait until they should rally enough under stimulation to permit a rapid exploration. In the third case the patient's condition was not quite so plainly hopeless. By an operation not occupying more than fifteen minutes the foetal sac was removed and the abdomen cleared of blood. The patient did not die of shock, but lived long enough to develop a fatal peritonitis. In this case, I think, we took the only reasonable course, and one which I have never regretted.

In some respects the initial symptoms of extra-uterine hæmorrhage resemble the symptoms of perforation of the vermiform appendix, and as regards the prognosis after interference the two cases are not dissimilar. The condition of extreme shock and collapse caused by a rapid fæcal extravasation through a perforated appendix is not unlike that seen in some cases of ruptured ectopic pregnancies. Leaving out the pallor of hæmorrhage, the two cases are almost precisely alike. Not only are they similar in the suddenness of their onset and, in severe cases, in the rapid march to a fatal termination, but they resemble each other in the brilliancy of the results after early surgical interference. In looking over a very large number of cases of appendicitis I find that my mortality after operation diminishes with the time between the attack and the operation,—that is to say, the earlier the operation, the larger the percentage of recoveries. The same thing is true in the treatment of extra-uterine hæmorrhages. At the Massachusetts General Hospital in 1893, there were twelve operations for extra-uterine pregnancy with twelve recoveries. The only fatal case after operation, in my own experience, was one in which the hæmorrhage had been going on so long (from ten to fourteen days) that a fatal termination was almost unavoidable. In two other fatal cases, already mentioned, no attempt was made to interfere, the patients being moribund at the time of the first visit. But in the cases of slowly progressing hæmorrhage early interference is almost surely successful.

Diagnosis.—The importance of an early diagnosis is extreme, for if within an hour, or in the very beginning of an hæmorrhagic extravasation, we open the abdomen, not only may the extravasated blood be removed with great facility, but the sac can be isolated

and tied off as easily as an ovary. This I have seen exemplified many times. If, on the other hand, we do not interfere until we are obliged to do so, we work at a great disadvantage, because the pelvic cavity is filled with blood, the peritoneum is infiltrated, and it is often impossible to isolate the sac.

The most important symptom in the diagnosis of extra-uterine hæmorrhage is pain. This is sharp, and is quickly followed by faintness. The latter symptom, with its accompanying pallor and feeble pulse, is not due entirely to the loss of blood, but depends to some extent upon peritoneal shock, the degree of which is not at all in proportion to the extent of the hæmorrhage. In some cases the amount of blood found in the abdominal cavity is trivial, and yet the patients have shown the signs of a most marked and extensive hæmorrhage.

Careful inquiry into other signs of pregnancy should be made, if time permits, in deciding upon the diagnosis. In some instances there will be a definite history; in others, none. While the existence of the ordinary signs of pregnancy confirms the diagnosis, their absence does not eliminate the possibility of this condition, for, in some cases, conception takes place, and the foetal sac is ruptured before the time has arrived for another menstruation. I have operated in at least one instance before there was time for a second menstrual flow. (See Case II.) In other cases the early signs of pregnancy have been present. A very important symptom is the condition of the breast. Large and tender breasts with discolored areolæ confirm the diagnosis. In short, any of the ordinary symptoms of pregnancy which accompany or precede an attack of sudden pain in the abdomen, with or without a tumor, with or without faintness or peritoneal shock, should suggest the possibility of a serious pelvic condition, and should justify at least the most careful watching, the surgeon being ready at any moment to interfere.

In addition to the subjective symptoms, there are certain objective signs which are of great importance. If the hæmorrhage is extensive and free, we shall find a mass in the pouch of Douglas; in extreme cases the liquid part of the blood will have spread itself among the intestines enough to cause dulness in the

flanks. In cases of circumscribed hæmorrhage a tumor will be found in some part of the pelvic region. This hæmatoma may be in the posterior cul-de-sac, at the right or the left horn of the uterus, or in its fundus; it may appear above the pubes, or it may be deep down in the pelvis and difficult of access. If the opportunity is given for frequent examination, the tumor can be observed at times to increase rapidly in size. In such cases the mass consists of clotted blood, and seems to be covered by peritoneum. With the exception, perhaps, of some bloody serum in the abdominal cavity, there will be no distinct hæmorrhagic extravasation. I have observed this fact several times. The tumor is usually somewhat tender, but not fluctuating. It has the boggy sensation to the touch which we get in certain forms of ovarian tumor with thick colloid contents. In very few instances have I ever been able to detect fluctuation.

In three instances I have been called to patients in whom the presence of fibroids has led to the diagnosis of extra-uterine pregnancy. The early discovery of an asymmetrical uterus, with a clear history of pregnancy, led to this mistake in which I fully shared in one case. Pain and other pelvic disturbances associated with a tumor near the uterus in a pregnant woman should certainly create suspicion. Often, indeed, it will be found impossible to eliminate an ectopic gestation until prolonged observation has shown that it is the uterus and not the tumor that is enlarging. In this condition, as in suspected extra-uterine pregnancy, the passage of the sound is clearly unjustifiable, for in case of error a miscarriage may result. In one case of pregnancy complicated by fibroid, a physician had introduced a sound to the fundus. In spite of this fact, I adhered to the opinion that the pregnancy was probably normal. The birth of a healthy child at term proved the correctness of that diagnosis. While it is impossible, therefore, at times to say beyond question that there is or is not an ectopic pregnancy, the suspicion of this condition is enough to demand most careful observation and preparation. After two or three months the diagnosis will be established beyond question by the characteristic appearance of the enlarged uterus upon which the now comparatively small fibroids can be felt as smooth,

hard, and usually sessile growths. The physical appearances are not unlike those seen in ovarian tumors, in which a small, hard tumor rests upon a single large cyst.

In two instances the diagnosis of extra-uterine pregnancy had been made by well-known gynæcologists. In each preparations for abdominal section were made, and in both an ordinary miscarriage was found to be in progress. In one of these cases the physician was confident that the fœtus lay in the left tube so near the uterus that the sac by enlargement finally became intra-uterine,—a very reasonable explanation.

When, therefore, we are called to a woman who, with or without a history of previous attacks, has been seized with sudden pain in the pelvic region; if we find a rapid pulse, a pale face, and other symptoms of general shock; if the abdomen is distended and tender; if the flanks are dull, with fluid in the posterior cul-de-sac, or if we have a slowly-growing and tender tumor, whether or not a history of pregnancy accompanies these symptoms, we can be quite sure that we have a case of ruptured blood-vessel in an extra-uterine gestation, in the Fallopian tube, or in the broad ligament.

Treatment.—The surgical treatment of extra-uterine pregnancy depends upon the nature of the case. In free abdominal hæmorrhage there is but one course to follow. This is early exploration and removal of the sac with as much free blood as possible from the abdominal cavity. In those cases of localized hæmorrhage in which a distinct tumor can be felt, a question may arise whether to remove the tumor completely, or whether to drain it without opening the general cavity of the abdomen. In still another class of cases in which the tumor presents itself in the posterior cul-de-sac, the question of vaginal drainage presents itself.

First, when there is free extravasation into the abdominal cavity,—this class comprises the fulminating and fatal cases of extra-uterine hæmorrhage. As far as I have been able to observe from personal experience this class of cases results from early rupture of a small fœtal sac. I have usually found a small opening in the tumor, from which blood could be seen slowly to

escape. The abdominal cavity has contained clots and free blood disseminated throughout. I do not mean to say that this form of hæmorrhage may not take place in advanced extra-uterine fœtation, but it has generally been present in the first few weeks of the condition. Whether it takes place early in the pregnancy or not makes little difference in the necessity for immediate exploration. Hæmorrhages confined to the pelvis, in which there is no free extravasation into the abdominal cavity, can be studied and treated at leisure, unless the hæmatocele ruptures and the symptoms of a general hæmorrhagic extravasation follow. In free abdominal hæmorrhage the abdomen should be opened as soon as the diagnosis has been made. Search should be made at once for the bleeding point unless it is obscured by an extensive infiltration. In some cases I have found very little infiltration of the surrounding tissues. Blood has been found perfectly fluid and free in the pelvis and the abdominal cavity. The local infiltration has been trivial, so that it has been possible to tie and remove the sac without difficulty and without obscurity. On the other hand, at times the peritoneum of the broad ligament, the subperitoneal tissues, the covering of the sigmoid flexure, and the rectum have been thickened and considerably altered by hæmorrhagic infiltration. In such cases it has been almost impossible to find and isolate the sac. In some instances I have removed the clots and have been able also to find and take out the thickened sac; but the prognosis has seemed more serious in such cases on account of the difficulty of thoroughly turning out the blood. Unless the operation is most thoroughly aseptic in every detail, blood remaining in any considerable amount in the abdominal cavity of a patient who is very much reduced makes so good a culture medium for micro-organisms that they reproduce themselves too rapidly for the enfeebled circulation to take care of them. Not that this condition makes the case hopeless: in several instances I have had recovery follow even under these unfavorable circumstances; but in one case (the only fatal one after operation) such haste was necessary that the abdomen was not prepared with the usual thoroughness. A large hæmatoma was found, which had ruptured; the abdomen was filled with free blood. The hæma-

toma was broken up and scooped out. The free blood was removed as far as possible, yet that which remained was probably contaminated at the time of operation, and the patient's feeble condition rendered it impossible for the peritoneum to take care of the micro-organisms. She, therefore, died of a general peritonitis in three or four days.

Secondly, in the treatment of a hæmatoma in which there is no free blood in the abdominal cavity, we have to deal with a tumor filling to a certain extent the pelvis. The amount of blood lost in the formation of this hæmatocele may be enough to cause pallor and rapid pulse. On cutting through the abdominal wall a dark tumor, evidently covered by peritoneum, presents itself in the wound. In my earlier operations I fastened this tumor by a few stitches to the abdominal wound, and drained the cavity after removing the clots. This procedure I have adopted in several instances, always with a favorable result. Twice I have broken down all the adhesions of a hæmatoma of this kind, have scooped out the blood through a large opening in the abdomen, and closed the wound at once. In one of these cases (the one above cited) the patient died of peritonitis. There was, in addition to the hæmatoma, a free escape of fluid into the abdominal cavity. In another case, though the amount of blood removed was excessive, the patient made an interrupted recovery after tight closing of the wound.

The arguments in favor of removing an hæmatoma by scooping out its contents and by closing the abdomen at once are, first, the thoroughness of the operation; second, the removal of the foetal sac (if the cause is a pregnancy), and, third, the immediate closure of the wound. The chief advantage of draining the hæmatocele without opening the general cavity of the abdomen lies in the fact that the dangers of a peritonitis are lessened. The disadvantages of this method consist in the possibility of local infection and long-continued suppuration, and in the fact that we do not remove the sac and foetus thoroughly. That this method destroys the life of the ovum cannot be denied. In all cases of this kind coming under my observation recovery has followed, though convalescence has been protracted. The selec-

tion of methods, it seems to me, should depend somewhat upon whether the general peritoneal cavity contains free blood or not. If the sac has been ruptured, and if there is an extensive hæmorrhage into the abdominal cavity, this blood should be entirely removed by free abdominal section, and the sac with its contents should be taken out as thoroughly as possible. If there is any doubt as to the thoroughness of this procedure, or if there is any hæmorrhage going on after the operation, then the pelvis should be packed with gauze for a short time. Perhaps an improvement on this method would be to pack with gauze for a few days and then to close. Unless we can feel very sure that there has been no infection during our manipulations, care must be taken to provide for draining away the toxic products of germ-infection.

Thirdly, we have for consideration those forms of hæmatocele which present themselves only in the posterior cul-de-sac. While it is true that the treatment of these cases by abdominal section has afforded very brilliant results, yet there are instances in which, it seems to me, there is less danger to the patient by adopting vaginal drainage. In my own experience I have employed this method twice only. In these cases there was a well-marked hæmatocele presenting in the pouch of Douglas. A free incision gave evacuation to a large amount of coagulated blood. There was no infection of the wound, and the patient made a prompt recovery.

Finally, in the treatment of these cases each one must be considered from its own merits. In my opinion there is no general rule to be applied to every special case. In some, the well-known disadvantages of an abdominal section may be avoided by vaginal drainage. In others, the safety of the patient lies not only in the most thorough eradication of the disease itself, but also in the removal of the extravasated blood.

In all cases in which it is possible to do a leisurely and thorough operation, the prognosis, both as to the immediate and the remote effects, is good. In those cases, however, in which, from the bad condition of the patient, it is impossible either to prepare her properly or to do a careful and leisurely operation,

that procedure should be selected which takes the least time and by which the abdominal cavity is exposed as little as possible to contamination.

In cases of doubtful infection after the removal, or the attempted removal, of the hæmatocele by laparotomy, provision should be made for temporary drainage by means of gauze. In those cases in which the blood has been well removed, in which the sac has been tied, and all possibility of hæmorrhage has been checked, the abdomen may be closed at once.

The wisdom of opening the abdomen in doubtful cases of hæmorrhage may be questioned. It must be admitted that early and invariable resort to the knife under conditions of doubt detracts in time from that careful attention to detail which is essential to differential diagnosis; and that there is soon developed a tendency to loose methods in both subjective and objective examination. Such results of indiscriminate surgical interference are deplorable, not only on account of their demoralizing tendency, but because of the direct harm that may be done, first, to the patient, and, secondly, to the art of medicine and surgery. Not that explorations should be deemed unjustifiable under certain conditions; on the contrary, they are demanded in doubtful cases of ectopic gestation. They certainly should not be performed until every reasonable means of differential diagnosis has been exhausted, and even then only in case there is a chance that good can be done.

When there is good reason to suspect a faulty pregnancy in its early development I believe in immediate exploration, for the sole reason that a few minutes or a few hours may place the patient beyond the reach of aid,—an accident that can by no means be predicted, and one which is even more formidable than a perforation of the appendix vermiformis. The operation of urgency, moreover, must be attended by a vastly greater risk, because of unfavorable surroundings, incomplete preparation, collapsed patient, and possibly an incompetent or inexperienced operator.

The mortality in deliberate operations upon well-prepared patients in good condition, at the hands of an experienced oper-

ator, is very small indeed; that of operations of urgency, considerable. Practically, all cases must be operated upon at one time or another. Hence it is obvious that early operation is always desirable in doubtful as well as in certain cases.

(1) The first case reported illustrates extra-uterine pregnancy at about full term.

CASE I.—Mrs. B., aged twenty-six, first seen by me May 19, 1888, in consultation with Dr. Graves, of Woburn. She had been married nine years, but never pregnant. The menstruation had been regular and natural up to the previous September, when the flow, beginning as usual, soon seemed abnormal, and finally became continuous, was increased by exertion, and occasionally profuse. Soon the ordinary signs of pregnancy manifested themselves. She went on without mishap until, about two months after she first felt motion, she became suddenly collapsed after intense pain in the bowels and over the left hip. She recovered from this attack to have similar ones March 11 and April 2. With each much blood in clots was passed from the uterus. During the attack of April 2 there were regular pains, but nothing came. At the time of the expected confinement nothing suggesting decidua was passed. Up to this time there had been no question that the case was one of uncomplicated pregnancy.

The abdomen was found to contain a large, fluctuating, and symmetrical tumor, in which no mass could be felt. The abdomen was tympanitic in the flanks and epigastrium. The uterus was not enlarged, nor did it move with the tumor. In spite of the history of the case, pointing almost unmistakably towards pregnancy, I was of the opinion that it was a case of simple unilocular cyst of the ovary, with unusual history and complications.

The patient was admitted to the Massachusetts General Hospital, and on June 22, 1888, an incision three inches in length was made in the linea alba, between the umbilicus and the pubes, through which I came down upon a vascular tumor with apparently a distinct muscular wall seemingly everywhere adherent, the whole very much like a malignant growth of the ovary. So little did the appearance suggest anything that could be removed that I was almost persuaded to abandon the operation. By Dr. John Homans's advice, however, I carried the incision down through the mass until I came upon a cyst, filled with chocolate-colored fluid, in which I could feel unmistakably the parts of a large foetus.

The soft and friable placenta was everywhere adherent, with its centre opposite the bifurcation of the abdominal aorta. Most of it was detached without hæmorrhage, especially that portion situated in the true pelvis.

Drainage was provided for by placing a large tube through the posterior cul-de-sac into the vagina. The other end of the tube was left in the lower angle of the abdominal wound.

The patient made a good recovery, and was sent home in August, with a small sinus still discharging from the abdominal wound. A month later she reported at the hospital for examination, very much improved in general health and appearance, and with the abdominal wound practically well.

The most important point in this case was the treatment of the placenta. Death has usually been due to hæmorrhage from efforts at detachment, or from septicæmia from long-continued absorption. I believe that moderate efforts should be made in these cases to remove the placenta, and that failing that a drainage-tube should be passed through from above out the vagina, through the pouch of Douglas.

CASE II. *Tubal Pregnancy; Rupture During the Third Week and Hæmorrhage into the Abdominal Cavity; Laparotomy; Recovery.*

—Mrs. J. E. P., aged thirty-seven; married seventeen years; had a miscarriage at six months, a year after marriage. Since then has never been pregnant. The catamenia have been regular of late. The last flow was three weeks before entrance. On Sunday morning, July 1, having felt in usual health during the night, she was suddenly seized with very severe pain, sharp and darting in character, in lower abdomen. After lasting three or four hours the pain disappeared. She was able to do her usual work the next day. Tuesday morning, July 3, the pain again returned, and has continued ever since. Patient has felt faint and sick, with nausea and vomiting. Bowels moved three days ago; since then constipated.

Dr. F. B. Harrington saw this case in consultation with Dr. Schofield early in the morning of the 4th, and advised her to be taken at once to the hospital, her condition being such as to make an exploration probably necessary in a few hours.

On entrance she was pale and anxious. The temperature was

97° F.; the pulse 80, weak; the respiration 30. The abdomen was not distended. There was some dullness on percussion in right iliac region, but no resistance or tumor could be felt. On vaginal examination an indistinct, tender tumor was found close to the uterus.

The patient vomited repeatedly during the morning of the 4th. The pulse grew weaker in spite of stimulants, and she was rapidly becoming collapsed.

A consultation was held at noon, at which the prevailing opinion was in favor of immediate exploration. The diagnosis was very doubtful, but no suggestion of pregnancy was made. The history was absolutely negative, and the only probable condition that suggested itself was hæmorrhage from some unknown cause.

Inasmuch as there was some evidence from physical examination pointing to the right ovarian region, the incision was in the right linea semilunaris. On opening the peritoneal cavity there was a spurt of bright blood so profuse and so alarming that it seemed for a moment that an abdominal aneurism had been opened. In a few seconds, however, clots of blood began to escape, and it was seen at once that the hæmorrhage had been going on for some time, and that this sudden outpouring of blood was simply the emptying of the distended abdominal cavity.

On enlarging the opening to about five inches, beginning two inches above Poupart's ligament, the right Fallopian tube was found distended to about the size of a large olive, in which, near the ovarian extremity, there was a rent admitting the finger-tip, from which blood was rapidly oozing. The bleeding tumor was easily isolated, secured, and removed.

The patient made a rapid and uneventful recovery, and was discharged well, August 8, 1888.

Dr. R. H. Fitz examined the specimen and reported that it was a case of ruptured tubal pregnancy.

It is quite justifiable to say that this woman would have died of hæmorrhage in a short time if nothing had been done. The diagnosis was involved in obscurity, no one present having even mentioned the real cause of the symptoms. Prompt interference in this case saved a life which would have been lost inevitably by a few hours' delay. It is interesting to observe that the symptoms in this case appeared before the time for another menstrual period.

(2) In the following three cases the condition of the patients was so low as to render the advisability of operation extremely doubtful.

CASE III. *Faintness and Pain in Abdomen of Sudden Onset; Rapid Collapse; Death without Operation; Probable Extra-Uterine Pregnancy with Rupture and Hemorrhage into Abdominal Cavity.*—

Mrs. —, aged thirty-one; multipara. Last menstruation in April; in May there was some peculiar interference with the period. Shreds were passed from the uterus. It was not known exactly what had happened, but there was something peculiar about it. The breasts were somewhat tender and swollen. The question of pregnancy was in mind. The night before my visit, at eleven o'clock, she was taken with faintness and pain in the abdomen, which soon subsided. An hour later she had a similar attack, and fainted. At three o'clock a physician was summoned, who found the patient collapsed. A surgeon was called in consultation; a diagnosis of ruptured extra-uterine pregnancy with hæmorrhage into the abdominal cavity was made, and preparations for immediate laparotomy were begun, but the pulse was imperceptible, and interference was deemed hopeless. Every effort was made to strengthen the pulse. I saw the patient at ten o'clock. She was then pulseless, the respirations were shallow and rapid, and there was great restlessness. Death took place while we were preparing for transfusion.

CASE IV. *Severe Attacks of Sudden Pain in Left Ovarian Region followed by Flowing; One Month after Onset of this Symptom Sudden Collapse and Death, while Patient was apparently in Good Condition.*—Mrs. H. M. N., aged thirty-seven; married five years; no children. (This history was obtained from her husband after her death.) Miscarriage at six months four years ago. About a month before entrance she was seized with sudden pain in the left ovarian region so severe that she had to go to bed. Three days later flowing began, which lasted until a few days before death. During July there were two other attacks of pain, each of which was followed by collapse. On entrance to the hospital she seemed to be in good condition, and said that she had been sent in for uterine trouble. About an hour after admission I saw her, and gave directions for examination the following morning. There was nothing unusual in her appearance; nor was she suffering from pain. An hour later my assistants were summoned in great haste to find her pulseless and collapsed.

An hour later I found her condition so extreme that no operation could be thought of. She was seen in consultation by Drs. Cabot and Warren, who confirmed this opinion. Her only hope was in rallying enough to permit a rapid laparotomy. She did not improve, however, but rapidly failed, and died forty-eight hours after the onset of her symptoms.

In these two cases the practical question arose whether to operate in the face of impending death or to wait until the patient should revive enough to justify a rapid laparotomy. It seemed to me clear in both cases that the slightest additional shock would prove fatal; that etherization of only a few minutes could not be borne; that the patient was moribund; that the only possible chance of recovery lay in stimulating the flagging pulse. Both patients died. Laparotomy could have brought about no worse result; and it has always been a question whether it would not have been better to interfere, in spite of the pulseless condition of the patient. That patients do rally from an apparently lifeless state I have at times observed, though I do not recall an instance in which an operation undertaken upon a patient apparently moribund had not been followed by death. Nevertheless, after the experience of these two cases, it seemed desirable, should a similar case occur, to try the effect of interference. When, therefore, on January 23, 1894, I was called to see Mrs. E. M. T., with a history of ruptured extra-uterine pregnancy, I felt prepared to give her the benefit of an exploration.

CASE V. *Pains in Abdomen During Two Weeks, Suggesting those of Labor; Distention and Tenderness of Abdomen; Profound Shock; Operation; Removal of Fœtus and Large Blood Clot; Death from General Peritonitis.*—Mrs. E. M. T., of Wakefield, aged thirty-three, had been married ten years, but never had been pregnant. Two weeks before I saw her in consultation with Dr. Dutton she had been seized with severe pain in the bowels. She had passed one period and had reached another, when she was seized with what seemed to be severe labor-pains, though there had been no suspicion of pregnancy. During the preceding two weeks she had complained at times of pains in the abdomen, but thought nothing of them. On the day of my visit the pain had come on about noon; at four o'clock I found her

pale, restless, and groaning. The abdomen was distended and tender, and in the lower part there was a mass which seemed to fill the pelvis. There was a bulging in the posterior cul-de-sac; the flanks were dull. The history of menstrual suppression, with the physical signs, made the diagnosis of ruptured extra-uterine pregnancy very positive. The patient's general condition was bad. Her pulse was 140, and very feeble; the respirations were rapid and shallow. She was not, however, in the evidently dying condition of the two preceding cases. The preparations for opening the abdomen were necessarily hasty. The skin was shaved, scrubbed, and treated with the usual solutions. On cutting through the peritoneum free blood was found throughout the abdominal cavity. Under ether the pulse improved somewhat. The pelvis was filled by a mass recently ruptured, evidently an hæmatocele, which reached nearly half-way to the umbilicus. The adhesions which enclosed this mass were separated, and about a quart of dark clotted blood was removed. There was a small tumor near the left ovary, about which all the parts were darkly infiltrated. The sigmoid flexure was thickened and hæmorrhagic. At one time this seemed to me to be the tumor, the discolored mass resembling very much an infiltrated broad ligament. The ovary and foetal sac were with difficulty separated and removed, the pedicle being tied with silk. The abdominal cavity was cleansed with dry gauze. No irrigation was used. The abdominal wound was closed without drainage. A small foetus was found in the mass removed from the pelvis. On the following day the patient's pulse was 120, respiration 27, and temperature 99.5°. There was no vomiting, and no distention. Two days later there was a well-developed general peritonitis, causing death five days after the operation.

This case resembles the two preceding cases in the severity of the symptoms and in the rapidity of their onset. Unlike those cases, however, there seemed to be slight hope from interference. Had the operation been aseptic in its details, the patient would probably have recovered. On this ground the experience is encouraging. The error in the technique was in the necessarily rapid and imperfect preparation of the skin. The presence of abundant material for germ-growth, in the form of blood-serum, probably permitted micro-organisms to multiply too rapidly for the enfeebled peritoneal circulation to remove their products.

The type represented by the last three cases brings up questions very different from those to be considered in connection with a deliberately made diagnosis of unruptured sac. In the latter case we can come to our conclusion after a careful study, and we can apply the remedy when the patient is in good condition and when all the details of our preparation are perfected. In considering the wisdom of surgical interference, therefore, the high mortality necessarily attending cases of great urgency should not deter us from operating under those favoring conditions in which the prognosis is extremely good. Moreover, operations in even the gravest cases are successful often enough to justify interference unless the patient is actually moribund.

CASE VI. *Extra-Uterine Pregnancy with Rupture Occurring in Patient from whom Gall-Stones had been Recently Removed, the Symptoms at first Suggesting further Hepatic Trouble; Tumor finally Presenting in Pouch of Douglas; Operation declined; Sudden Collapse and Death.*—Mrs. A. E. F., Lexington, December 13, 1892. This patient had been successfully operated upon by me for gall-stones the previous summer. Some eighty or more stones had been removed. She returned home to her work about August 31. On September 6 she was taken with pain across the abdomen, quite unlike the pain she had had when suffering from gall-stones. She recovered from this attack under the treatment of Dr. Tilton. During the latter part of November she had four similar attacks. With each the abdomen was much distended, and there seemed to be some evidence of peritonitis. In the last attack before my visit, she was in a state of collapse. The abdomen was distended and tympanitic. The diagnosis, in view of the previous history of gall-stones, seemed to be that another stone had become impacted somewhere in the biliary passages, but there was no jaundice. Vaginal examination at that time showed a thickening in the posterior cul-de-sac. The temperature was 103° F., and the pulse was about 100. There was very severe vomiting. There was still some tenderness in the posterior cul-de-sac. On examination I found a normal pulse and a normal temperature. The abdomen was somewhat distended. Coils of intestine could be seen through the thin abdominal walls. There was dulness in the flank. A tender mass could be felt in the rectum, pressing down from the posterior cul-de-sac against the sacrum. By

vagina the tumor could be detected in the pouch of Douglas, in the centre of which was a soft spot, suggesting fluid. The uterus was slightly enlarged, and the fundus could be felt directly above the pubes. It seemed to me that the mass in the pelvis was large enough to cause some mechanical obstruction. There was no suggestion of an extra-uterine pregnancy. An operation was advised, but she said that she would rather die than have anything done.

On the following day at one o'clock she was seized again with pain, became collapsed, and died at five. At the autopsy a ruptured extra-uterine foetal sac was found.

In this case it was clear that the mass in the pelvis demanded immediate interference. Had this been permitted, the patient would undoubtedly have recovered. I should have explored through the pouch of Douglas, and the relief to the pressure would thereby have prevented the fatal rupture. This case is one of extreme interest, showing as it does the possible existence of an extra-uterine pregnancy in a case in which such a state of things is not even suspected.

(3) The following cases illustrate extra-uterine pregnancy with patient in good condition.

CASE VII. *Sudden Pain in Hypogastrium; Mass felt in Right Pelvis; Operation; Large Clots removed; Recovery.*—Mrs. A. K., aged thirty-eight. Seen at Massachusetts General Hospital in July, 1892. The patient was seized with sudden pain in the hypogastrium. There were no constitutional symptoms. There was dulness in the flanks, and a mass could be felt to the right of the uterus. The diagnosis of extra-uterine pregnancy was made. The abdomen was opened. A large amount of free blood was found in the abdominal cavity. Clots were removed from the pelvis, which was packed with gauze for a short time. Patient made an uneventful recovery.

CASE VIII. *Extra-Uterine Pregnancy with Urgent Symptoms; Patient's General Condition Good.*—Mrs. M. B. M., aged thirty; seen with Dr. O'Shea, in East Boston, on November 17, 1893. Six weeks before, in church, she felt faint and looked pale. She was able to walk home. Two or three days later had violent pain, with difficult micturition. Pregnant twice before. During the second pregnancy had catamenia as usual. Three days after this fainting attack she began to flow. She thought she was pregnant. The flowing

was so excessive that the attending physician curetted the uterus, thinking that there was a miscarriage. There was no fever.

On examination I found the pulse 100 and the temperature 99° F. There was a symmetrical tumor of the abdomen just above the pubes, filled with fluid. By vagina a small mass could be felt in the posterior cul-de-sac. The diagnosis of extra-uterine pregnancy was made, and she was sent to the Massachusetts General Hospital, where she was admitted to the service of Dr. Warren, on November 22, 1893. She was kept under observation until the 25th, when she was seized with renewed pain in the abdomen, with faintness and collapse. Dr. J. W. Elliot opened the abdomen and found the right tube enlarged, the fimbriated extremity being the size of a lemon. The tube and ovary on that side were removed. She was discharged well on December 2. The mass removed proved to be a foetal sac.

This patient was one of twelve successful cases at the Massachusetts General Hospital in the year 1893. It should be remembered, however, that they do not belong to the class of fulminating and rapidly fatal cases like Cases III, IV, V, and VI. In this case the patient's condition, though critical, permitted careful preparation and deliberate operation. I have no doubt that operations for extra-uterine pregnancies, or for other hæmorrhages, will be followed by just as satisfactory results under such favorable conditions.

CASE IX. *Extra-Uterine Pregnancy; Operation; Recovery.*—Mrs. X., aged thirty-five. Seen in Cambridge with Dr. Fanny Berlin. This patient presented the usual symptoms of pregnancy, except that there was some irregularity in the menstrual function. A tumor about the size of an orange could be felt in the pelvis. There was clear evidence of extravasated blood. Operation was advised. Dr. Berlin opened the abdomen and removed a foetal sac. This operation was followed by rapid and permanent recovery.

CASE X. *Pain in the Abdomen of Five Weeks' Duration; Slight Fever; Tumor in Abdomen; Operation; Removal of Foetal Sac and of Extravasated Blood from Broad Ligament; Recovery.*—Mrs. F. W. C., aged thirty-seven. Seen in Bradford, November 5, 1893, with Drs. Atwood, Clement, and Anthony. Five weeks before my visit patient was taken with very severe pain in the abdomen,

after having passed one menstrual period. She had been complaining of tenderness in the breasts, with nausea. For the past two weeks there had been a slight elevation of temperature at night,—about 100° F. During the five weeks preceding my visit there had been several attacks of renewed pain requiring opium. The pulse was at one time 155; the temperature 101.5° F. The abdomen was somewhat distended. In the pelvis there was a tumor about the size of a child's head, connected with the left side of the uterus. This extended into the pelvis and could be felt in the posterior cul-de-sac. Immediate operation was advised. The abdominal cavity contained free blood. The tumor consisted of extravasated and clotted blood in the layers of the left broad ligament, entangling the remains of a small fœtus. The blood was removed as thoroughly as possible and the foetal sac tied. The abdominal wound was closed without drainage. This patient's temperature and pulse rapidly fell, and she made a most gratifying recovery.

(4) The following are cases of hæmatoma of doubtful origin.

CASE XI. *Extra-Uterine Hæmorrhage; Suprapubic Drainage.*
—Mrs. J. F. C., aged thirty-four; referred to me by Dr. Boutwell, of Manchester, N. H., February, 1892; married nine years; no children; may have been pregnant once. About two months ago she was taken with severe pain in the bowels. She had gone a month over the menstrual period. There was nausea. The pain in the abdomen came on suddenly and was accompanied by vomiting. During the last two months there have been frequent attacks of pain like the first. Examination showed a tumor the size of a child's head extending from the pubes half-way to the umbilicus. This was found to be a thick-walled sac containing clotted blood. The walls of the sac were stitched to the wound and the blood was removed by irrigation. No evidence of foetal structure could be found. Convalescence from this operation was rapid, but a sinus remained for some time. About four weeks after this operation she was seized again with pain, the attack being very similar to the first. A tumor rapidly formed to the left of the uterus, as in the first attack. No interference was attempted. The swelling subsided gradually, to appear on the right side some weeks later. The appearance of the last tumor was sudden, and was accompanied by the same symptoms as

the first. The patient was kept quiet in bed for some weeks, and was discharged June 11, 1892. Ultimate recovery was perfect, and the patient has been in good health ever since.

The diagnosis in this case is, unfortunately, obscure. The history pointed to a faulty pregnancy, and I fully expected to find some evidence of fetal structure. The recurrence of hæmorrhage to the right and to the left of the uterus is to me inexplicable, unless it was due to renewed extravasations from a common source. In the latter event it would seem that the hæmorrhage would reappear at the still open wound. The practical question arising in this case was that of renewed interference. The symptoms were at no time urgent, and careful watching showed, from day to day, rapid subsidence of the tumor. That there were recurring hæmorrhages there can scarcely be a doubt; the rapid appearance and gradual subsidence of the tumors can be accounted for on no other supposition.

CASE XII. *Extra-Uterine Hæmorrhage; Vaginal Drainage.*—Mrs. A. M., aged thirty-six; Malden, July 18, 1892. One child, eight years old. Two years ago, twins; three miscarriages. Previous to entering the hospital the May period was missed. Menstruation appeared in June. Four weeks before entrance was seized by very severe pain in the abdomen. A tumor presenting through the posterior cul-de-sac was tapped, and a large amount of blood withdrawn. Great relief followed this treatment, and she was discharged well on August 9.

CASE XIII. *Extra-Uterine Hæmorrhage without Urgent Symptoms; Sudden Pain in the Abdomen; Pelvic Tumor connected with the Uterus supposed to be an Extra-Uterine Pregnancy; Laparotomy and Removal of Tumor; Hematosalpinx without Evidence of Pregnancy; Recovery.*—Mrs. W. H. B., aged thirty-seven. Seen in Manchester, N. H., with Dr. H. W. Boutwell, on January 8, 1893. Three confinements before this. Four weeks before, while in usual health, she had an attack of pain and soreness low down in the left side of the abdomen. This required morphia. The temperature was 103° F., and the pulse 120. The abdomen was distended and everywhere tender. The patient had not suspected pregnancy, though she had gone four or five days over the time for her menstrual period, when the pain began. She then began to flow, and has flowed ever

since. A mass was found in the posterior cul-de-sac similar to that in Case VI. The patient was taken to a private hospital, and the abdomen was opened. On the left a tumor was found about the size of a lemon, containing blood and what seemed to be a small fœtus. The mass was removed and the abdomen closed without drainage. Examination of the tumor by the pathologist failed to show any evidence of pregnancy.

The gross appearances in this case were clearly indicative of a pregnancy, and much surprise was expressed at the pathologist's report. The symptoms, with the condition found at the time of my first examination, clearly justified the diagnosis of an extra-uterine pregnancy with rupture. Whatever may have been the cause, the indications were clear, and, in my judgment, should be followed whenever that combination of symptoms exists.

CASE XIV. *Sudden Pain, Faintness, and Vomiting; Tumor in Posterior Cul-de-sac; Incision of Cul-de-sac; Evacuation of Liquid Blood.*—Miss X., unmarried; servant; patient of Dr. Bell, of Somerville, entered the Massachusetts General Hospital in October, 1893, with history of sudden pain in the abdomen, faintness, and vomiting. She was under observation for some days. A mass was found in the pelvis, presenting in the posterior cul-de-sac. The question of pregnancy was considered in this case, but the patient being unmarried, and all positive signs of pregnancy being absent, the diagnosis of simple hæmatocele was made. Free incision was made into the posterior cul-de-sac, through which a large quantity of liquid blood was evacuated. The patient made a rapid and uneventful recovery.

CASE XV. *Three Years ago Sudden, Sharp Pain in Abdomen; No Constitutional Symptoms; Mass to Right of Uterus; Clotted Blood removed by Vagina; Recovery.*—Miss G. W., aged twenty-four. Seen June 4, 1894. Four years ago had the grippe. After that she had a discharge of pus from the vagina, about a pint. Last Christmas she had another evacuation of pus from the vagina. Three years ago she had sudden sharp pain in the abdomen. No constitutional symptoms. On examination a mass was found on the right side of the uterus, bulging into the vagina. This was freely opened, and a hæmatocele was found, from which about half a pint of clotted blood was removed. After this the patient did well.

CASE XVI. *Extensive Hemorrhage into the Pelvis; Large*

Abdominal Tumor; Operation advised but delayed; Spontaneous Subsidence and Disappearance of Tumor; Recovery.—Mrs. C. S. U., aged twenty-seven. Seen on February 14, 1894. The attending physician informed me that this patient had been troubled for two years with a retroverted uterus, which had received appropriate treatment. She was subject to colicky pains during menstruation. On January 7 she had an attack of severe pain in the abdomen. She had just got over her menstrual period. A tumor was found at the right horn of the uterus. This mass grew rapidly larger, and at about the tenth day fluctuation could be detected by bimanual palpation. On the twelfth day the tumor was aspirated, and about a pint and a half of blood withdrawn. The temperature, which had been somewhat elevated, became normal, and the tumor disappeared. There next appeared a mass on the left side, which was aspirated in about fourteen days, and half a pint of blood withdrawn. The tumor on this side rapidly disappeared. Soon after the disappearance of the second tumor the patient began to vomit. This symptom was very obstinate, and was accompanied later by the reappearance of the mass in the pelvis in the median line.

The temperature had averaged 101° F. at night. The pulse was 120. On examination I found the whole lower abdomen dull as far as the umbilicus. The general appearance was not good. The face was pale and pasty, though this was said to be her usual appearance. In the posterior cul-de-sac there was a hard mass, somewhat irregular in outline. The diagnosis of extensive hæmatoma of possible extra-uterine origin was made, and operation was advised. On my arrival two days later prepared to operate, I found the general condition much improved and a marked diminution in the size of the mass. Delay was therefore advised. A slow convalescence followed, the tumor entirely disappearing.

(5) Two cases of abdominal hæmorrhage from diseased ovaries and tubes in which no positive evidence of pregnancy could be found.

CASE XVII. *Sudden, Sharp Pain in Epigastrium; Tenderness in Right Iliac Region; Mass Behind Uterus; Operation; Free Blood and Clots removed; Right Tube (swollen) removed; Recovery Slow, complicated with Fæcal Fistula.*—Mrs. K. C., aged twenty-six; seen in July, 1892; one child, nine years old; previous history of salpin-

gitis. Had been suffering from nausea, general malaise, and colicky pains. Taken shortly before entrance with sudden sharp pain in the epigastrium, accompanied by blanching. The flanks were dull, and there was tenderness in the right lower quadrant. A mass could be felt behind the uterus. The abdomen was found filled with free blood and clots. There was a mass to the left of and behind the uterus. The right tube was swollen. The blood was removed as thoroughly as possible, and the right tube was tied and removed. After cleansing the pelvic cavity, a glass drainage-tube was inserted and packed about with iodoform gauze. This patient was discharged on October 17, after a tedious convalescence, during which there was a fæcal fistula. She finally made a good recovery. The diagnosis of extra-uterine pregnancy was never positively confirmed.

CASE XVIII. *Sharp Pain in Hypogastrium; Vaginal Flow; Tumor in Right Inguinal Region; Operation; Removal of Ruptured Right Tube with Clot: Extensive Adhesions; Recovery.*—Mrs. A. C. W., aged thirty-eight; seen on July 10, 1892; one child, nine years old; no miscarriages. Four weeks before entering the hospital she was seized with sharp pain in the hypogastrium, followed by bright blood in the vagina. Three days later she had a similar attack. On examination a slight resistance was found in the right inguinal region. This mass extended to the right horn of the uterus. The right tube was found to be ruptured and surrounded by dark clot. The uterus was displaced by a mass which filled the right half of the pelvis, low down. It was adherent to the intestines and to the rectum. The adhesions were separated, and the mass was delivered and its pedicle tied with silk. Glass drainage-tube and iodoform gauze were used. She was discharged well on September 20.

In this, as in the preceding case, the diagnosis of chronic perisalpingitis and periovaritis was made.

Although no evidence of pregnancy could be found in these cases, yet the same questions present themselves to the surgeon as in cases of actual pregnancy. Indeed, there is an additional reason for interference in the latter cases, in that there is usually a septic element in the contents of the inflamed tube. In the rupture of a foetal sac there is presumably no septic element present; hence, in such cases, the danger is limited to hæmorrhage. The signs by which we can differentiate a hæmato-

salpinx from an ectopic gestation are not clear enough for a positive opinion. In the last two cases the history and the physical signs were by no means inconsistent with ectopic gestation with rupture. If the condition at the time of the operation points to an inflamed tube, then the question of drainage comes into prominence, for it is, in my opinion, never safe to close the abdominal cavity, in cases presumably septic, without a few hours' drainage. In clean cases, on the other hand, like ruptured pregnancies, once having controlled the hæmorrhage, the abdomen may be sealed immediately. Not to enumerate too many disadvantages of drainage, it is enough to say that in my experience and belief all forms of drainage should be dispensed with if it is reasonably safe to do so. The persistence of a sinus and the occasional formation of a fæcal fistula alone are reasons sufficient to justify our doing away with drainage whenever we are positive that the septic element is not present. If any rule is to be laid down in connection with the question of immediate closure, it is that in all doubtful cases provision shall be made for drainage. The shorter the time that a tube or gauze is left in the better.

The practical consideration in cases of pelvic hæmorrhage lies not so much in the etiology as in the proper line of treatment. In all save one of the cases in which operation was performed recovery took place. In this instance operation was undertaken as a forlorn hope—the patient being in a state of collapse—after two deaths under similar circumstances without operation. All the other cases recovered.

The prognosis, therefore, of operation upon pelvic hæmorrhage, whether resulting from extra-uterine pregnancy or other cause, is good. On the other hand, the danger from sudden rupture is extreme; an hour is enough to place the patient beyond the possibility of surgical relief. It seems to me clear, therefore, that surgical interference should be practised in all cases of pelvic tumor in which hæmorrhage is suspected, especially if there is ground for believing that the origin is an ectopic gestation.

A CASE OF HORSESHOE KIDNEY.

By RICHARD BARTLETT OLESON, M.D.,

OF CHICAGO,

HOUSE PHYSICIAN, COOK COUNTY HOSPITAL.

C. A., Swede, aged twenty-six, was admitted to Cook County Hospital, August 17, 1894, suffering with double lobar pneumonia, affecting chiefly right upper and left lower lobes. Grew steadily worse, with symptoms of general involvement of lungs in pneumonic process, and died August 22.

Post-mortem.—Aside from the changes in the lungs (where all five lobes were found in different stages from beginning hyperæmia to gray hepatization) the only interesting change was in the kidney, which was single.

The organ lay with two extremities in the usual situation of the kidneys. The lower margins of what should be the normal kidneys were continuous, with no apparent break in their structure. Two adventitious kidneys existed, turned with their hila directed obliquely outward and downward, and their inferior margins continuous across the front of the aortic bifurcation. Each of these four kidneys was anatomically, and apparently functionally, perfect, with pelvis, ureter, vein, and artery, only differing from normal kidneys in fusing imperceptibly into each other.

On each side the *ureter* arose normally from a perfect pelvis, passed vertically down behind the kidney tissue, and drained the pelvis of the other kidney on that side by an opening at its most dependent portion, continuing thereafter in its normal course. The pelves of the adventitious kidneys were somewhat wider than normal.

The renal *arteries* were normal on each side. In addition there arose an adventitious vessel from the front of the aorta just above its bifurcation. This separated into two portions, which entered each supplementary kidney at its hilum.

The *veins* were similarly arranged,—two normal renal veins and an extra trunk draining by the union of two tributaries the lower kidneys and entering the front of the inferior vena cava.

This anomaly is interesting as being the only case of horse-shoe kidney in 507 recent autopsies at Cook County Hospital, and is also interesting on account of the perfection of the development of all the four kidneys.

In the same series of 507 autopsies there were three cases of renal malposition. Two were in males. In all three the right kidney was affected, and in all it lay at the margin of the false pelvis.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, October 10, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

STRICTURE OF THE ŒSOPHAGUS SUCCESSFULLY DIVIDED WITH A STRING (ABBE'S METHOD) AFTER GASTROSTOMY.

DR. F. W. MURRAY presented a child, two years of age, which had entered St. Luke's Hospital in February, 1894, with a stricture of the œsophagus caused by swallowing a quantity of caustic potash a year before. When first seen the boy was in pretty fair condition, was able to take a small quantity of milk by swallowing slowly, but any rapidity was promptly followed by regurgitation. But all attempts to pass even the finest filiform bougie through the œsophagus into the stomach failed, the point of obstruction being seven inches from the incisors. During the next few weeks his condition remained unchanged, excepting the occurrence of vomiting at times. During this period several attempts—some of them under ether—were made to pass bougies to the stomach, but they were always unsuccessful. The later attempts were followed by inability to swallow for a day or two, and nutrient enemata were resorted to. As the patient was gradually losing strength, and it was evident that the stricture was impassable, operation by the "string" method of Dr. Abbe was decided on. On April 23, under ether, through an incision along the left costal cartilages, the stomach was exposed, opened, and united to the skin by silk sutures. Upon the left forefinger as a guide a small rubber bougie was readily introduced into the œsophagus from below and passed upward for three inches, when it was arrested. Smaller-sized instruments and also a number of filiform bougies were introduced with the same result. After trying in vain for twenty minutes to get

past the obstruction, it was decided to desist as the child was growing weak.

The stomach was then sutured by a continuous suture to parietal peritoneum and skin, a rubber catheter left in the wound, sterilized dressing. The child reacted well from the operation and was fed through the tube and per rectum for several days, thus giving the œsophagus an entire rest. Beyond a slight leakage from the stomach, there was nothing worthy of note.

On May 2, under ether, a small gum-elastic bougie was introduced into the œsophagus from below and shortly afterwards it passed upward into the mouth. A long piece of stout braided silk was tied to the lower end of the bougie, the bougie drawn out through the mouth, and the silk thus carried from the stomach to the mouth. A larger bougie was passed along the string from the stomach and crowded into the stricture; the silk string, steadied by a finger passed into the pharynx and stomach, was drawn up and down several times, after which the bougie passed the stricture with ease. These manipulations were repeated with larger bougies until a No. 26 French bougie passed with ease in both directions. Upper two-thirds of stomach wound closed by Lembert's sutures, also a like amount of the abdominal wound, stomach united to skin, small tube left in, also the string. On day following operation feeding was commenced by mouth and tube alternately, and the child did perfectly well. On May 5, 26, and 28, French bougie passed to stomach with ease. May 10, gastrotomy wound closed with sutures, and from this date all food was given by mouth. Liquid diet at first, in a few days soft solids were added, on May 23, solid food was allowed. Bougies were passed every three days, and by the middle of June, No. 32 French bougie passed with ease to the stomach. The child gained flesh and strength, swallowed solids without difficulty, and in July went to the country in excellent condition. No. 32 French bougie passes readily, and as the child grows older larger-sized instruments will be used. An interesting point concerning the case was the inability to pass the stricture from below at the time of the first operation. Instead of proceeding immediately to external œsophagotomy he decided to give the œsophagus an entire rest for a few days by feeding through the tube in the stomach and also per rectum. His opinion was that by so doing the spasmodic condition and irritability about the stricture would disappear, thereby allowing a fine instrument to be passed from below. The result fully justified this opinion, and the additional advantage of avoiding an

external œsophagotomy was gained. The leakage of food from the stomach was of small amount, and for future cases could be completely controlled by the rubber tube fitted with a double bulb.

DR. F. KAMMERER said that in a case of stricture of the œsophagus in a boy of six years, in the German Hospital, Dr. Gerster had opened the stomach and divided the stricture according to Dr. Abbe's method. Later on the stomach was closed. A bougie of fair size was introduced from the mouth every day, at first in narcosis, then without the same. For some reason, however, the stricture again contracted and Dr. Meyer was compelled to re-open the stomach to nourish the patient. Owing to the difficulties encountered at this second gastrostomy, the latter was unsatisfactory, in so far as leakage was marked, and the assimilation of food on this account insufficient. After the patient came under Dr. Kammerer's care he tried conscientiously, from fifteen to thirty minutes at times, to pass a sound through the œsophagus, both from the stomach and from the mouth, the patient being under narcosis, but did not succeed. Finally, the patient's condition having become very low, he resorted to œsophagotomy, which proved a very simple task in the emaciated condition of the patient, and very soon succeeded in passing a tube on into the stomach. The patient, however, died that night. He very much regretted not having done œsophagotomy at an earlier date. The case certainly shows that strictures, which cannot be passed from stomach or mouth, are occasionally amenable to this form of treatment from an incision in the œsophagus. In his case the stricture was situated only a few inches below the point of incision, and it can be readily understood how the opening into it was more easily found at so short a distance and in a straight direction.

DR. ABBE stated that the two cases of stricture of the œsophagus which he showed last year, one a woman and the other a child, three years of age, treated by dividing the stricture with a string, are still perfectly well and the patients are able to eat everything. The bougie has not been passed in the case of the child for several months. The woman introduces the largest size occasionally. There has been no tendency to contraction.

DR. FRED. LANGE referred to the last case of impermeable stricture of the œsophagus which had come under his observation, and in which he was able only after repeated attempts to pass the finest filiform bougie. He added that, owing to the spasmodic condition which was often present in the muscles, such attempts should always

be made under narcosis. Then with the aid of an instrument with a number of blades screwed on a steel staff, very similar to one used in cases of urethral stricture, he was able to make a number of divisions of the constricted tissue, and within three or four weeks dilated up to No. 30 French. The child could then swallow everything.

OPERATIVE PROCEDURES IN CONGENITAL AND TRAUMATIC DISLOCATIONS OF THE HIP IN CHILDREN.

DR. V. P. GIBNEY read a paper with the above title (see page 621), and presented a number of patients in illustration of the subject, stating that he presented them because he was anxious to elicit discussion in the treatment of congenital dislocation of the hip.

Hoffa's operation does not seem to have gained much ground in this country. In Boston they have had about the same experience with it as in New York,—a good many relapses. Curiously enough, the two cases operated upon in this country by Hoffa himself have relapsed. One was in a child two years old, which is said to be the typical age for the operation.

The operation itself is a difficult one, chiefly because of the manual force required, and the injury to the tissues likely to result therefrom in putting the head of the femur in its new place.

The opinion has been entertained that these cases of congenital dislocation of the hip never or rarely develop pain. A number of cases which have come under observation at the Hospital for the Ruptured and Crippled have developed pain sooner or later, and in one the pain was most acute, and was treated by traction a long time, in order to relieve it. Finally he was operated upon for the relief of that one symptom. He has now a lady under observation, thirty-two years of age, who was without pain until a year ago, when, for some reason unknown to her, pain developed in the hip.

He doubted very much whether operative treatment would prove of much benefit in double hip-dislocation. Without it the patients learn to balance themselves quite well, and walk comfortably with a swinging gait. Before pain developed, in the case of the lady just referred to, she was an excellent dancer.

DR. L. A. STIMSON asked whether these cases represented the average results of the operation, and being answered by Dr. Gibney

that, as far as he was informed, they did, said, in that case it seemed to him that practically the only result is to create a stiff joint, to attach the femur immovably to the ileum, and that, in two of the three cases this had been done in a relatively disadvantageous position,—flexion and adduction. Such a result did not seem to him to justify so serious an operation; and if that is all that is to be expected from it he should think it advisable to restrict interference to cases in which the functional disability is great, and to seek to obtain the fixation by simpler measures.

DR. ABBE queried whether a corset could not be so adapted as to enable some of these patients to walk who were unable to do so without a certain amount of fixation. He recalled a case of double congenital hip-dislocation treated satisfactorily in that manner, which was presented at the Congress in Berlin four years ago.

DR. GIBNEY replied that he had seen corsets which came down a distance over the pelvis, and were fixed by perineal straps, resulting in a certain amount of benefit. Some had been put on with a view to crowd the head of the femur down towards the acetabulum, and form a new socket. Hoffa himself used one of some form in convalescent cases after operation, but Dr. Gibney was of opinion that some atrophy of muscles must result and make it necessary to continue the support.

TWO CASES OF SUCCESSFUL SPLENECTOMY.

DR. FRANCIS MARKOE¹ presented two patients who had been subjected by him to operation for removal of enlarged spleen. The histories of the cases are as follows:

CASE I. *Hypertrophied Spleen*.—D. B., a Russian, aged fourteen, had been admitted to St. Luke's Hospital on January 18, 1893, with the following history: He had suffered from acute malarial poisoning in 1891, for which he had been treated at Mount Sinai Hospital, and discharged cured. Later on recurrent attacks of intermittent fever, and evidences of chronic malaria. During the acute attacks the liver had been enlarged, but there had been no noticeable enlargement of the spleen until September, 1892, when it began to increase in size and give rise to constant pain.

When admitted, he complained only of enlarged and painful

¹ These cases, and those following, presented by Dr. Markoe, were presented at the meeting of the Surgical Society of February 14, 1894; having been omitted from the report of that meeting, already published, they are here inserted.

abdomen with progressive loss of flesh and strength. He had had no chills for some months; no fever and no pain in the bones. The spleen then occupied the entire hypochondriac and umbilical regions extending three fingers breadth below the umbilicus.

On February 24, 1893, examination of fresh blood by Dr. Southworth showed red cells somewhat pale, but of good size and shape, with well-formed and even rouleaux. Hæmoglobin 62 per cent. Red cells 4,032,000. White cells very rare, so that no proper estimate could be made. Staining showed same rarity of white cells, but those present to be normal. On October 28, 1893, he had been referred to the speaker by Dr. Beverly Robinson, with the statement that all medical methods of treatment had been faithfully tried without benefit, and that now respiration was becoming seriously interfered with.

Physical examination at this time gave the following result:

Thorax, negative. Abdomen,—liver enlarged, free border easily felt two and a half inches below costal arch. This enlargement, symmetrical, and extending well over to left side, where the outline was lost owing to pressure of spleen, whose sharp edge could be felt running from under the tip of sternum, vertically downward and backward with a convex curve, which extended beyond umbilicus towards the left, almost reaching Poupart's ligament.

No glandular enlargement elsewhere observed. Leukæmia and active malaria having been excluded, and medical measures having failed to check the progressive enlargement of the spleen which now threatened by mechanical pressure the life of the patient, surgical interference had been decided legitimate at a consultation of the hospital staff. Consent had been readily obtained from both the patient and his father, and on December 1, 1893, the speaker had removed the spleen, ably assisted by his colleague, Dr. B. F. Curtis. The operation had proved one of exceeding difficulty, owing to the presence of enormously dilated superficial and deep veins in the parietes, and the broadness of the pedicle rich with similarly dilated and thin-walled vessels.

A long median incision with one at right angles to its centre had permitted the delivery of the spleen. The broad and exceedingly vascular pedicle had then been tied off with locked ligatures supplemented by one of strong silk including the whole. No drainage had been employed, and the parietal wound was closed by sutures.

The reaction after the operation had been good, but twenty-four

hours later intense pulmonary congestion with œdema supervened, which for some time seriously menaced the life of the patient. Under the careful watching, and direction of Dr. Robinson this had been finally overcome, and the further progress had been satisfactory. Primary union having occurred throughout the wound, except at the lowest of the lateral skin sutures, where a small stitch abscess occurred, probably infected at the time of the chest poulticing.

Examination of fresh blood just before operation showed,—

Red cells normal, good size, shape, and color. Resistance only moderate.

Red cells, 4,604,000 per cubic millimetre.

White cells, 3125 per cubic millimetre.

Hæmoglobin, 77 per cent.

Ehrlich stains.

Lymphocytes, 22 per cent.

Large mononuclear leucocytes, 6 per cent.

Transitional forms, 6 per cent.

Polynuclear leucocytes, 70 per cent.

Eosinophile cells, 2 per cent.

Summary: White cells reduced in number with normal relations in the proportions of the different forms of white cells.

Red cells fairly normal in number and structure.

Hæmoglobin somewhat reduced.

One month later examination of blood showed improvement of condition of red cells in number, color, and resistance.

White cells showed leucocytosis, while before they were below the normal.

Increase in eosinophile cells slightly beyond the normal limit.

The removed spleen weighed about four pounds.

The report of the pathologist, Dr. J. S. Thacher, was as follows:

"On cutting into the spleen it was found to be of firm consistence, dark in color, and abundantly sprinkled with minute, deeply-yellow spots, with red borders measuring 1.3 millimetres in diameter, and in shape round, triangular, Y-shaped, or irregular.

"On microscopical examination these spots were found to be hæmorrhages, having at their centres connective tissue with many large branching cells and some irregular hyaline masses, which were evidently altered blood-cells. The rest of the tissue showed distended cavernous veins and thickened reticular frame-work,—that is, the appearances of a chronic congestion of the organ."

Notwithstanding that at no time were malarial organisms found in the blood, the dependence of the hypertrophy upon the previous malarial poisoning seemed probable.

CASE II. *Displaced Hypertrophied Spleen.*—This patient had been operated upon by the speaker on August 10, 1892, for an enlarged spleen (five and a half pounds), which, displaced and firmly impacted in the pelvis, had given rise to distressing symptoms. She had been presented at a meeting of the Surgical Society on March 8, 1893, and the report of her case published in the ANNALS OF SURGERY, Vol. XVII, p. 582, 1893. The speaker now presented her to show that from the recovery from operation to the present date she had enjoyed perfect health, entirely free from all discomfort. The following report from Dr. Southworth, who had quite recently examined her blood, might prove interesting (February 13, 1894):

"Hæmoglobin, 78 per cent.; red cells, 4,672,000 per cubic millimetre; white cells, 12,500. Fresh specimen: Red cells of excellent size, shape, and color. Resistance fair. Rouleaux formation good. Most of the white cells seen are small. Ehrlich stains:—Lymphocytes (small mononuclear), 49 per cent.; large mononuclear, 5 per cent.; transition forms, 0 per cent.; polynuclear, 46 per cent.; eosinophile, 0 per cent. This unusual percentage of mononuclear cells (54 per cent.) is very interesting. The increase of the lymphocytes from the normal, 25 per cent., to 49 per cent. suggests a vicarious action on the part of the lymph-nodes, whose product they are supposed to be. The total number of white cells is somewhat increased, but it has no significance unless constant."

PYLOROPLASTY FOR CICATRICIAL STENOSIS.

DR. MARKOE also presented a man, aged forty-nine years, who had been subjected to pyloroplasty. His history was as follows: He had been admitted to the medical service of St. Luke's Hospital on August 18, 1893. About a year previous he began to suffer from constipation and pain, most acute after the ingestion of certain kinds of food (meat, etc.), and located in lower epigastrium. In addition, he perceptibly lost flesh and strength, until seven months later he was obliged to give up work.

Physical examination proved negative, but the use of the stomach-tube showed marked stagnation of stomach contents and no free hydrochloric acid. The diagnosis of probable gastric carcinoma had been made. Systematic treatment including lavage and selected diet

had been adopted, but notwithstanding, vomiting began during the latter part of October, and as he steadily deteriorated, he had been transferred to the surgical service on November 8, 1893.

Examination again proved negative except for a vague sense of resistance over umbilicus. He had grown very feeble and emaciated, weighing but eighty-five pounds. On November 24, 1893, under ether, a median laparotomy had been performed. This had revealed a slightly-dilated stomach, which appeared normal in all respects save that the pyloric extremity seemed unusually firm and somewhat thickened. A small opening had then been made in the anterior wall of the stomach at the point selected for entero-anastomosis, should it prove indicated, and its interior explored. Here again nothing pathological had been detected until the pylorus had been reached. Its lumen had then been found so contracted as to admit nothing larger than a uterine sound.

Typical pyloroplasty had then been performed after the method of Heineke-Mikulicz.

The patient's recovery had been uneventful, and he had left the hospital on February 12, 1894, in perfect health, weighing 111 pounds (a gain of 26 pounds).

CHOLEDOCHO-LITHECTOMY.

DR. F. H. MARKOE presented a woman, aged forty-seven years, with the following history: She had suffered attacks of biliary colic for sixteen years, averaging about three a year. She had never been jaundiced until the attack before the last (about a year previous), the duration of which had been about three weeks. It had been very severe in character, and accompanied by chills and fever.

During the latter part of August, 1893, she had been again seized with pain associated with nausea, vomiting, and intense jaundice. Four weeks later she entered St. Luke's Hospital. Physical examination showed an enlarged liver, but no other organic lesions. The jaundice had been pronounced, and the resulting pruritus most distressing.

On September 29 he had opened the abdomen by a vertical incision through the right linea semilunaris. The gall-bladder had been found empty. After careful search a hard nodule had been discovered close to the junction of the ducts. An attempt had been made to reach this through the cystic duct, after opening the gall-bladder, but it could not be dislodged and brought within reach.

The parietal opening had then been still further enlarged by a transverse incision through the rectus muscle, and after separation of fairly firm adhesions, the obstruction had been located in the common duct. A longitudinal incision had then been made through the thickened walls of the duct, and a calculus the size of an ordinary marble removed. No other obstruction had been found. The openings in both duct and bladder had been sutured with fine silk, and the parietal wound closed except at one point where narrow wicks of iodoform gauze led down to the respective lines of visceral suture. All packing had been removed on the fifth day, and as the piece leading to the gall-bladder had been loosed, a free discharge of bile had taken place. By the end of a month the sinus had definitely closed, and the jaundice almost completely disappeared. She was now in perfect health, with a firm cicatrix.

EDITORIAL ARTICLES.

HOFFA ON THE PATHOLOGICAL ANATOMY OF SCOLIOSIS.¹

THE German Surgical Congress was fortunate in being addressed upon this interesting and important subject by the well-known author of the "Lehrbuch der orthopädischen Chirurgie."

The scoliotic spine does not have its convexity directed to the side, he says, but laterally and posteriorly, so that the most pronounced wedge-formation^r is in the most posterior segment of the lateral curvature.

The asymmetry of the scoliotic trunk arises from the fact that the concave side is lower than the other, being also larger and broader.

In cases of pronounced scoliosis the difference between the two sides of the bodies of the vertebræ is very marked. The original border of the bodies can be identified as a denser segment of bone sunken into the nucleus pulposus. A large portion of bone is found situated on the concave side between this border and the root of the vertebral arch, which has in profile the form of an olecranon. The apex of this piece is to be found where the inclination of the vertebræ begins. Its base is directed backward and somewhat downward. The borders of the two basilar surfaces of the body project prominently towards the concave side and posteriorly, while they are supported by strong pillars of compact substance in the depths of the bone.

When the scoliotic vertebra is viewed from above, it is observed that the oblique portion of the concave side is greatly widened towards the vertebral arch, so that a large part of the arch on the concave side seems to be drawn in towards body. The posterior border

¹ Zur pathologischen Anatomie der Skoliose (mit Demonstrationen), Verhandlungen der deutschen Gesellschaft für Chirurgie, XXII Kongress, 1894.

of the thus widened body is thereby rendered thin and sharp on the concave side, while the anterior border of the vertebral foramen loses in roundness.

Though little known but of great importance is the condition of the ascending articular processes. It is characteristic that the spinous processes on the concave side are considerably lower than those on the other side. This depression is often so pronounced that the superior part of the joint is reduced to a thin, transparent leaf of bone. With the articular process, of course, the entire condition of the articular surfaces become changed; in fact, these latter changes are discernible before any change can be discovered elsewhere in the process. The first thing of a pathological nature which appears upon the articular surface is a broadening of the concave surface and a narrowing of the convex surface. The enlargement of the concave surface of the joint proceeds by the gradually-increasing atrophy of the concave joint surface so that the descending articular process of the upper vertebra forms a new joint surface upon the lower part of the lower vertebra, in such a way that the upper surface of the transverse process is involved in the new arthrosis.

At the angle of the vertebral wedge the following condition is eventually found: The superior articular surfaces of the concave side are widened considerably in a lateral direction, so that they often involve the entire width of the articular processes. At the same time they become situated lower, reduced in size, and their direction becomes changed. They become directed obliquely from behind and internally forward and outward, so that the outer sides are directed more anteriorly than the inner, because they are no longer placed transversely, but with their superior free border directed forward.

The form of the nearthrosis is very characteristic. When the vertebra is in a position of strong rotation the joint surface is seen to be widened more towards the concavity of the curvature, so that the end of the joint projects somewhat over the anterior part of the arch. When the rotation of the vertebra is less, this lateral projection of the joint is not observed, but a deep lateral groove is present.

In pronounced cases the ascending articular processes of the lowest vertebra of the curvature are seen to form a wall which is formed in a half-circle and placed from behind and internally forward and outward, and flattened towards the median line. The corresponding descending processes of the upper vertebra are so formed as to fit into this ridge, and all motion to the side or forward or backward is rendered impossible.

Hoffa gives the above description as an addition to the knowledge of the pathological anatomy of scoliosis, and regards it as the key to the explanation of the origin of the disease.

Another cause for the lateral curvature of the spine is the predisposition due to an abnormal softness of the skeleton, which eventually produces the wedge-shaped deformity of the vertebral bodies just as the same condition results in a curving of the bones in rachitis.

As these bones gradually become hardened by the deposit of new calcareous cells, it will be found that the largest deposit of bone-cells takes place on the concave side or where the pressure and compression is greatest.

On the convex side where the pressure is least an absorption or rarefaction of the bone takes place. A series of sections through the body of the bone shows a gradual transformation of the dense to the spongy condition as the sections are made from the concavity towards the convexity.

The architecture of the scoliotic spine depends entirely upon the statical conditions. This is seen in the angle where the bony layers are arranged obliquely,—that is, in an angle to the two basal surfaces of the bone. This obliquity of the position of the intra-osseous columns shows the direction of the force which is acting upon the bone.

The direction of these bony columns in such a compressed portion of bone is directly the reverse of that of the fibres of the cortex of the same bone. The direction of the latter depends upon the longitudinal ligaments, but the former depends upon the pressure due to torsion and curvature.

When no torsion of the intra-osseous columns is found in the bodies of scoliotic vertebra, what explanation can be offered for the so-called torsion of the scoliotic spine? Nicoladoni has claimed that the torsion of the scoliotic spinal column is only an apparent condition and not real, and that the deception is caused by the general optic impression of the pronounced asymmetry of the bodies. Hoffa is inclined to agree with Nicoladoni, though he does not entirely deny the existence of torsion. The torsion is not at the articulations between the vertebræ, but is due to changes by which the individual vertebræ are changed in their relation to one another by being rotated upon a diagonal axis.

Purely lateral movements are possible only in the lumbar region. Every lateral bending of the dorsal and especially of the cervical portions of the spinal column is combined with rotation of the spine about a diagonal axis, when the spine is bent slightly to one side, first the intervertebral disks are compressed on the concave side, while at the same time the articular surfaces upon the concave side come together. If, now, the bending is carried still further, a hypomochlion is formed, over which the vertebra at the farthest convexity of the curvature is carried. This vertebra makes a rotation around a diagonal axis, and, of course, swings its neighbors with it. The pressure from a bone does not impinge directly upon the lateral surfaces of the vertebra at the vertex of the curvature, but upon the lateral and posterior aspect; and thus the greatest obliquity is found at this part. This is the first sign of torsion. A later sign which can be seen on the body of the vertebra is the drawing in of the anterior end of the root of the arch into the superior surface of the body. This causes the declination of the spinal column, or what is the same thing, the loss of the physiological antero-posterior curvature. To this change belongs the broadening of the postero-lateral aspect of the inferior surface of the body towards the concavity of the curvature, which is associated with a sliding forward of this part upon the next body below. Further signs of torsion must be sought for in the articular processes, induced by the sliding

forward of one vertebra upon its lower neighbor. Here the changes are not difficult to discover. Hoffa has observed the forward dislocation of the superior articular surface and the posterior dislocation of the inferior surface on the concave side, as well as the change of direction of the joint cavity, which becomes more obliquely situated so that the upper articular surface of the joint becomes drawn from within outward and more forward.

There are still a large number of the phenomena of torsion which are easily explained. They depend simply upon the pressure upon the diagonally dislocated vertebræ.

The rotation of the upper surface of the body upon the lower surface is a result of such pressure. This rotation is found especially in the anterior portion of the body, and results from the traction of the anterior longitudinal ligament upon the bodies of the vertebræ.

JAMES P. WARBASSE.

REVIEWS OF BOOKS.

A MANUAL OF ORTHOPÆDIC SURGERY, FOR STUDENTS AND PRACTITIONERS. BY JAMES K. YOUNG, M.D., Instructor in Orthopædic Surgery, University of Pennsylvania. Octavo, 446 pages, with 285 illustrations. Philadelphia: Lea Brothers & Co., 1894.

The author adopts as his definition of orthopædic Surgery, "That department of medical science which includes the preventive, mechanical, and operative treatment of chronic and progressive deformities." The major part of the work known to-day as orthopædic and its literature pertain to diseases of the joints. These are treated more because of their danger to life and limb than because of their deforming tendencies *per se*; so that the word is better exemplified clinically than defined in terms of its derived meaning. Therapeutically this branch of surgery is distinguished by its extensive employment of mechanical devices, and the term has even been misused as though contradistinguished from operative. The book covers the field very broadly, and deals fully with operative as well as mechanical measures. The author believes, "Modern ideas demand that the orthopædic surgeon of to-day should be an educated surgeon in every sense of the word." The mechanical, however, necessarily constitutes the greater part of the therapeutics. In the main, good judgment is used in the selection of apparatus for description, and, as a rule, to which several exceptions will be noted, the author has preferred those forms whose simplicity makes them more generally useful.

Under the head of Pott's disease, recumbency is lightly dismissed with a warning against too much of it. To any one who has ventured to throw off the old bugbear fear of confinement, this will

seem a long step backward. By recumbency, with adjusted pressure, superincumbent weight becomes changed from a destructive to a reforming force. Only by recumbency with fixation and traction, if necessary, can reflex muscular spasm be abolished and the ideal state of rest be secured. As a matter of fact, patients whose spines are soft enough to excite reflex muscular spasm do not suffer from the confinement, even though it be continued for months. Nature does not demand rest and activity at the same time. It is not necessary that the patient should be deprived of sunlight or fresh air, and massage to the extremities is a very good substitute for exercise, and it is very satisfactory to note in the acute stage under these conditions the improvement in the general health and the loss of the characteristic drawn, tired, facial expression. When the spine outside of the diseased area has regained its flexibility it is time enough to cautiously permit more liberty under the protection of a brace. The author prefers steel to plaster of Paris, and gives his views in detail. Complications such as abscess and paraplegia are carefully considered.

Seventy-seven pages are devoted to the hip-joint disease and its treatment, and the subject is fully illustrated. The use of traction with adjustable inclined plane for flexion is hardly made explicit enough. The relative merit of the English and American methods is fairly stated. Under the head of Traction Splints the author recommends that with a sliding adjustable bar, and fails to mention the simpler apparatus long in use in the large orthopaedic clinics in New York and Brooklyn. Operative measures are presented with many citations from competent authorities.

The chapter on the diseases of the knee-joint is good. One of the most troublesome conditions accompanying disease of this articulation is, however, flexion with subluxation backward. The author criticises the Billroth splint as making the diseased joint the fulcrum, and thus exerting injurious pressure. This apparatus has long been in use with curved and slotted side-bars, and so arranged that the centre of motion is well in front of the joint. Extension is thus combined with longitudinal traction, and the deformity is very beau-

tifully overcome. The Judson brace, probably the simplest and most efficient instrument for fixing the knee-joint at any desired angle, is conspicuous by its absence, and, as in the treatment of hip-disease, here is an inclination to a complicated key and ratchet machine.

Lateral curvature is very thoroughly presented. Under the head of treatment the chief reliance is upon exercises; and this bold and commendable statement appears: "It will be observed that no mention has yet been made of the various apparatus employed for correction and maintenance in this deformity. The plaster-of-Paris jacket, myotomy, tenotomy, and forcible restoration under anæsthesia have, in the writer's opinion, no place in the treatment of lateral curvature."

The chapters devoted to paralysis, torticollis, neuromimesis, and trophic disturbances are very full. Probably in no other book on orthopædics has the neurology been so well considered.

Under the treatment of knock-knee and bow-legs the simple and efficient braces of Knight are not mentioned. Operative treatment is recommended as the rule after the third year.

The various deformities of the foot are carefully analyzed. Here also is preferred apparatus too intricate to ever come into general use. A very full *résumé* is given of the numerous operations. The various tenotomies, enucleation of the astragalus, cuneiform osteotomy, *brisement forcé*, and open incision are described, and their relative merits and indications compared. In those cases of *equinus* where the long bones rest in part on the calcis, and the astragalus forms a wedge in front, it is doubtful what is gained by waiting, as is advised, until the patient is five years old before removing it. In comparing this operation and cuneiform osteotomy it is to be regretted that the author has not had the benefit of Hartley's recent contributions. (ANNALS OF SURGERY, March, 1894; *New York Medical Record*, August, 1894.) The rubber-covered steel sole for the treatment of flat-foot is not new. It has been in use in Brooklyn for nearly four years.

The book is clear in style, practical, and well illustrated. There is no attempt on the part of the author to thrust his own inventions into undue prominence.

JOHN C. SCHAPPS.

A TREATISE ON APPENDICITIS. By GEORGE R. FOWLER, M.D., Brooklyn. Philadelphia: J. B. Lippincott Company, 1894.

The surgical world will be pleased to know that the series of articles which have appeared in the *ANNALS OF SURGERY*, under the heading of "Observations upon Appendicitis," have been collected into one volume by the author, and published under the more appropriate title of "A Treatise on Appendicitis. The great interest which these articles attracted during the course of their appearance renders an extended review unnecessary. They represent not only the most advanced surgical thought, but also present many new truths illustrated by a large amount of clinical material.

Of all that has been written upon this subject during the few years, in which the disease has been studied from the stand-point of modern pathology, no work has appeared in any language in which the subject has been so fully, so clearly, and so scientifically treated as in this. Our knowledge of appendicitis, which is so different from that of the old pathology, has accumulated so rapidly, and been illustrated by such a vast amount of clinical data, that such a treatise has become a necessity; and fortunate it is that, when the time came, there was an author ready with a thorough familiarity with the literature and a store of information gotten from an immense clinical experience to produce a modern treatise upon the subject.

The American Surgical Association is to be congratulated that this work has come from the pen of one of its members, and that the position of American surgical literature has been so strengthened by its appearance.

Besides the author's own work, the chapter on the "Pathological Anatomy of the Vermiform Appendix," which was written by Pro-

fessor J. M. Van Cott, Jr., is deserving of especial mention as embodying the most advanced views and the results of the author's own researches in the subject; for it must not be lost sight of that the pathological anatomy and etiology as well as the clinical study and treatment of appendicitis have been most largely contributed to by American pathologists.

This work should not only be in the library of every surgeon, but should be perused with especial care by the general practitioner.

JAMES P. WARBASSE.

TO CONTRIBUTORS AND SUBSCRIBERS.

All Contributions for Publication, Books for Review and Exchanges should be sent to the Editorial Office, 386 Grand Avenue, Brooklyn, N. Y.

Remittances for Subscriptions and Advertising and all business communications should be addressed to the

UNIVERSITY OF PENNSYLVANIA PRESS,

726 Filbert Street,
Philadelphia, Pa

INDEX.

- ABBE, R.**, Epithelioma of tongue, 71; Sarcoma of tongue, 72; Results of operations for cancer, 73; Disarticulation at hip, 79; Specimen of anthrax bacillus, 82; Coccygeal cysts, 172; Sarcoma of kidney, 176; Hip-joint amputations, 182; Transplantation of ureter, 183; Operations for traumatic paraplegia, 184; Intussusception, 419; Technique of operations for removal of sarcoma of kidney, 376; Retained gall-stones with contracted gall-bladder, 376; Late condition of cases of stricture of the œsophagus treated by the string-saw, 733.
- Abdominal drainage, determined by bacteriological examinations, 424.
- Abdominal wall, Neoplasms of, 372.
- Absorbable plates for effecting visceral approximation, results obtained by their use, 297.
- ALLIS, O. H.**, Prognosis in cases of strangulated umbilical hernia, 189.
- American Surgical Association, Review of Transactions of, for 1894, 620.
- Amputations of extremities, Neudörfer's method, 355.
- Anæsthesia by ether, Clinical notes on, 676; Statistics of, 594; Surgical, Review of Terrier's Manual of, 128.
- Anthrax bacillus, Specimen of, 82.
- Appendicitis, Pyæmia following, 422; Review of Fowler on, 751; Suppurative, Results of incision without removal of the appendix, 84.
- Appendix vermiformis, Multilocular, 186.
- ASHHURST, J., Jr.**, Personal experience in the treatment of strangulated hernia, 187, 191.
- ASHHURST, S.**, Treatment of strangulated hernia, 190.
- BACK**, Treatment of contusions and sprains of, 192.
- Bacteriological examinations and abdominal drainage, 424.
- BARTON, J. M.**, Results of evacuating appendical abscesses, without removal of the appendix, 84; Treatment of strangulated hernia, 189; of umbilical hernia, 190.
- BINNIE, J. F.**, Operative treatment of gall-stones impacted in the cystic or common bile ducts, 561.
- Bladder, urinary, Cases of excision of considerable portions of, 610; Stone in, 174, 175; Tumor of, 78, 174, 610.
- Blood-serum, Its employment in surgery, 477.
- BOND, C. J.**, Treatment of vesico-vaginal fistula by operation from within the bladder, 392.
- Bone, Dry necrosis of, 615.
- BRADFORD, E. H.**, Treatment of congenital dislocation of the hip, 129.
- Brain, Pickaxe wound of, 93.
- Branchial carcinoma, 599.
- BRANHAM, J. H.**, Intestinal obstruction from strangulation by an adhesion band, 59; Recovery after laparotomy, 59.
- Breast, cancer of, Results of operations for, Pilcher, 8; Murray, 180; Halsted, 497; Bull, 605; Technique of operations for, 180, 497; Tuberculosis of, 153, 417.
- BRIDDON, C. K.**, Cases of nephrectomy, 168, 170, 417; Coccygeal dermoid cyst undergoing epitheliomatous degen-

- eration, 171; Cholecystectomy, 367; Tumor of abdominal wall, 372; Ileotomy for carcinoma of colon, 414; Intussusception, 418.
- BRINTON, J. H., The surgical relations of the thoracic duct in the neck, 86.
- BRYANT, J. D., Results of operations for cancer, 74; Kelotomy under cocaine anaesthesia, 371; Sarcoma of the abdominal wall, 373.
- C**ACHEXIA thyreopriva, 426. (See also myxoedema.)
- Calculus, vesical, combined with papilloma, 174; Encysted, 175.
- CAMPBELL, G. G., Clinical notes on 300 cases of ether anaesthesia, 676.
- Cancer, Question of spontaneous healing in man, 476; Study of 170 cases of, 1, 73, 76.
- Cartilage, intermediary, Studies in the transplantation of, 617.
- Catgut, Sterilization of, by boiling in olive oil, 56.
- Charcot's disease of the hip in locomotor ataxia, 369.
- Cheever's lectures on surgery, Review of, 494.
- Cholecystectomy, Case of, 367. (See also surgery of the gall-passages.)
- Choledocholithectomy, 741.
- Cleft-palate, Operations for, 228, 598.
- Coccygeal dermoid cyst, Epitheliomatous degeneration of, 171.
- COLEY, W. B., Longevity after removal of cancerous breast, 181; Double Charcot's disease of the hip in locomotor ataxia, 369; Sarcoma of the abdominal walls, 372.
- COLLINS, J., Treatment of strangulated hernia, 190.
- Colon, carcinoma of, Ileotomy for, 414.
- Coxitis, Tuberculous, Results of conservative treatment of, 582.
- Cranicectomy in microcephalus, 596.
- CURTIS, B. F., Pathological dislocation at hip, 81; Pyloroplasty for ulcer of stomach, 176; Amputation of penis for epithelioma, 178; Hip-joint amputation, 182; Treatment of intussusception, 420.
- D**AWBARN, R. H. M., Technique of operations for removal of cancerous breast, 180; Hot saline solutions for intravenous infusions, 183; Operation for traumatic paraplegia, 185; Use of carbonic-acid-gas distention of colon to overcome intussusception, 419.
- DEAVER, J. B., Treatment of gangrenous hernia, 189.
- Diploë, Venous tumor of, 165.
- Duodenal ulcer, successful excision of, 241.
- Duodenum, Large pseudo-diverticulum of, 63.
- E**ASTMAN, B. L., Note on the sterilization of catgut by boiling in olive oil, 56.
- Eczema of surgeons, 592.
- Embryonal pathology, infective, Experimental researches in, 385.
- Ether anaesthesia, Clinical notes on, 676.
- Extension apparatus for the application of plaster bandages to the lower extremities and the pelvis, 617.
- Extra-uterine pregnancy and hæmorrhage, 705.
- F**EMUR, Old displacements of the upper end of, and their treatment, 27, 80, 621, 736.
- FENGER, C., Surgery of the ureter, 257.
- Fowler on appendicitis, Review of, 751.
- FREMONT-SMITH, F., Case of obstructive hypertrophy of the prostate gland treated by castration, 52.
- Frontal sinus, Epithelioma of, 416.
- G**ALLAUDET'S Manual of Surgery, Review of, 495.
- Gall-bladder, Contracted, enclosing gallstones, 376; Robson's cases of operations upon, 234.

Gall-stones impacted in the cystic or common ducts, 561.

Gangrene and pustulæ of skin, Peculiar form of, 481.

Garrigues's Text-Book of the Diseases of Women, Review of, 382.

Gastrostomy as a preliminary to treatment of stricture of the œsophagus, 733.

GERSTER, A. G., Operations for neoplasms of the tongue, 72.

GIBNEY, V. P., Treatment of old displacements of the upper end of the femur, 80; Operative procedures in congenital and traumatic dislocations of the hip in children, 621.

Gynæcology, American Text-Book of, Review of, 249.

HALSTED, W. S., Results of operations for cancer of the breast, 497.

HARRIS, M. L., Operative treatment of old unreduced dislocations of the hip, 319.

HARTE, R. H., Cases of Littre's hernia, 190; of pyæmia due to appendicitis, 422.

Hernia, femoral, Bassini's operation for radical cure of, 487; Gangrenous, Intestinal anastomosis in, 189; Incarcerated, of childhood, Statistics and prognosis of herniotomy for, 377; Littre's cases of, 190, 191; Omphalo-properitoneal, 244; Strangulated, Treatment of, 187; Strangulated, Operation for, under cocaine anæsthesia, 371; Umbilical strangulated, 189, 191.

Herniotomy in the incarcerated hernias of childhood, 377.

Hip-joint amputation, 79; with cocaine anæsthesia 181, 371; Congenital dislocation of, Treatment of, 80, 129, 138, 621; Disarticulation at, 79; Double Charcot's disease of, in locomotor ataxia, 369; Old unreduced traumatic dislocations of, Treatment of, 27, 319, 621, 736.

Hip-joint disease, tuberculous, Results of conservative treatment of, 582.

Horne on Trephining, Review of, 124.

Humerus, Dislocation of head of the, with fracture of the surgical neck, 70, 611.

Hydrocele, congenital, in an adult, Radical operation for, 93.

ILEOTOMY for carcinoma of colon, 414. Iliac arteries, Simultaneous ligation of both internal, for hæmorrhage during hysterectomy, 248; for hypertrophy of prostate gland, 44.

Intestine, Resection of ileo-cæcal coil of, 642; Strangulation by an adhesion band, 59; Recovery after laparotomy, 59; Traumatic rupture of, successfully treated by laparotomy and suture, 485.

Intravenous saline infusion during hip-joint amputation, 181.

Intussusception, Cases of, 418.

Israel, Experiences in the Surgery of the Kidneys, Review of, 384.

JAW, lower, Appliance to correct the deformity after removal of one-half of, 35, 78.

Jejunostomy, New method of, 239.

KAMMERER, F. W., External œsophagotomy for relief of stricture of œsophagus, 735.

Kidney, Horseshoe, 731; Sarcoma of, 176, 373; Surgery of, 384, 609. (See also Nephrectomy.)

Koenig's Text-Book of Surgery, Review of, 117.

LANGE, F., Stricture of œsophagus relieved by internal œsophagotomy, 735.

Leontiasis ossea, 367.

MCBURNEY, C., Cases illustrating the use of a mechanical appliance to correct the deformity after removal of half of the lower jaw, 35, 78; The incision made in the abdominal wall in cases of appendicitis, 38; Hip-joint amputation with direct pressure on

- common iliac through abdominal incision, and intravenous saline infusion, 181; Multilocular vermiform appendix, 186; Sarcoma of the kidney, 373.
- Macewen on Pyogenic Infective Diseases of the Brain and Spinal Cord, Review of, 489.
- MAFFUCCI, A., Experimental researches on infective embryonal pathology, 385; On the products of the tubercle bacillus, 556.
- MAGILL, W. S., Review of the results thus far obtained by the use of absorbable plates in effecting visceral approximation, 297; Resection of the ileo-cæcal coil of the intestine, 642.
- MARKOE, F. H., Splenectomy, 737; Pyloroplasty for cicatricial stenosis, 740; Cholecho-lithectomy, 741.
- MARTIN, E., Perineal testicle restored to its proper position, 94.
- MEARS, J. E., Umbilical hernia, 191.
- Medical Annual for 1894, Review of, 126.
- MEISENBACH, A. H., Neudörfer's method of amputating extremities, 355.
- MEYER, WILLY, Simultaneous ligation of both lateral iliac arteries for hypertrophy of the prostate gland, 44, 173, 174; Resection of vesical end of ureter for tumor of the bladder, 78; Coccyeal cysts, 173; Papilloma of the bladder combined with stone, 174; Encysted vesical calculus, 175; Amputation of penis, 179; Operations for traumatic paraplegia, 185; New urinal for continuous drainage after suprapubic cystotomy, 371.
- MORTON, T. G., Non-recurrence of cancer of breast during eighteen years, 94.
- MORTON, T. S. K., Radical operation for congenital hydrocele in an adult, 93.
- MURRAY, F. W., Cancer of breast removed with non-recurrence during nine years, 180; Stricture of œsophagus successfully divided with a string after gastrostomy, 733.
- MYERS, T. H., Treatment of congenital dislocation of the hip, 138.
- Myxœdema, 426, 595. (See also Cachexia thyreopriva.)
- NEILSON, T. R., Cases of Littre's hernia, 191.
- Nephrectomy, Cases of, 168, 170, 417. (See also Surgery of kidney.)
- NEW YORK SURGICAL SOCIETY, Trans. of, 70, 78, 168, 176, 367, 414, 733.
- Nose, Epithelioma of, 416.
- ŒSOPHAGOTOMY, External, for stricture, 735; At the Zurich Clinic for the removal of foreign bodies, 567; Internal, 734.
- Œsophagus, Stricture of, relieved by string-saw after gastrostomy, 733; By external œsophagotomy, 735; By internal œsophagotomy, 734.
- OLESON, R. B., Case of horseshoe kidney, 731.
- Omphalo-properitoneal hernia, 244.
- Osteomyelitis, sero-mucinoso, 616.
- Osteoplasty, Histological considerations of, 612.
- PALATE, cleft, Davies-Colley's operation for, 228.
- Paraplegia, traumatic, Operations for the relief of, 153, 184.
- PARKER, C. T., Leontiasis ossea, 367.
- Penis, amputation of, for epithelioma, 178.
- PENROSE, C. B., Use of bacteriological examinations to determine necessity for abdominal drainage, 424.
- PHILADELPHIA ACADEMY OF SURGERY, Transactions of, 84, 187, 422.
- PHILADELPHIA COLLEGE OF PHYSICIANS, Transactions of the surgical section of, 93.
- PILCHER, L. S., study of 170 cases of cancer, 1; Large pseudo-diverticulum of the duodenum, 63; venous tumor of the diploë, 165.
- POORE, C. T., Old displacements of the upper end of the femur and their treatment, 27, 80.

- PORTER, M. F., Uro-genital tuberculosis in the male, 396.
- PORTER, W. G., The marriage of syphilitics, 94; Treatment of strangulated hernia, 190.
- POWERS, C. A., Thyroid gland tissue tumor at foramen cæcum of tongue, 77; Tuberculosis of the breast, 159, 417.
- Prostate gland hypertrophy treated by simultaneous ligation of both internal iliac arteries, 44, 173; By castration, 52; By suprapubic prostatectomy, 606.
- Pyæmia due to appendicitis, 422.
- Pyloroplasty for cicatricial stenosis, 740; For ulcer of stomach, 176.
- RANSOHOFF, J., Thyroid abscess; Thyroidectomy, 406.
- Retrosternal struma, calcified, 602.
- Rhinoplasty from the arm, 598.
- RICHARDSON, M. H., Ectopic pregnancy and hæmorrhage, 705.
- ROBERTS, J. B., Pickaxe wound of the brain, 93.
- RUSHMORE, J. D., Herniotomy with cocaine anaesthesia, 372; Rydygier's method of osteoplastic resection of sacrum, 482.
- SACRUM, Osteoplastic resection of, 482.
- Scoliosis, The pathological anatomy of, 743.
- Skin gangrene and pustules, Peculiar form of, 481.
- Southern Surgical and Gynæcological Association, Transactions of, Vol. III, Review of, 127.
- Spinal cord and its appendages, Surgery of, 454; Operations on, for the relief of paraplegia, 153.
- Spleen, The surgery and physiology of, 205.
- Splenectomy, Successful cases of, 483, 737.
- Staphylorrhaphy, 228.
- STELWAGON, H. W., The marriage of syphilitics, 96.
- STIMSON, L. A., Dislocation of the head of the humerus, with fracture of its neck, 70; Results of operations for cancer, 75; Remarks on the results of Hoffa's operation for congenital dislocation of the hip, 736.
- Stomach-reefing, 484.
- Stomach ulcer, Pyloroplasty for, 176.
- Struma, Retrosternal, calcified, 602.
- Subumbilical space, Suppurative inflammation of, 108.
- Suppurative diseases, Spread of, in closed institutions, 474.
- Suprapubic prostatectomy, 606.
- Surgery, Review of Koenig's Text-Book of, 117.
- Sutton on Tumors, Review of, 120.
- Syphilis in the innocent, Review of Bulkley on, 253.
- Syphilitics, The marriage of, 94.
- TEMPORO-MAXILLARY ankylosis, New operation for, 597.
- Terrier's Manual of Surgical Anaesthesia, Review of, 128.
- Testicle, Perineal, restored to its proper position, 94; Strangulation of, from torsion of the spermatic cord, 97.
- Thoracic duct in the neck, Surgical relations of, 86; Operation wounds of, 87.
- Thyreoglossal duct, Cyst of, 599.
- Thyroidectomy for thyroid abscess, 406.
- Thyroid gland tissue at base of tongue, 77.
- Thyroid metastasis, Physiological function assumed by, 594.
- Thyroid question, 426.
- Thyroid tumor, Bony metastasis of, 600.
- Tongue, Epithelioma of, non-recurrence after excision, 71; Excisions, after-treatment of, 231; Sarcoma of, non-recurrence after excision, 72; Tumor at foramen cæcum of, 77.
- Trephining in its ancient and modern aspects, Review of Horne on, 124.
- Tubercle bacillus, Experimental researches upon the products of the, 556.

- Tuberculosis of the breast, 153; Of the hip-joint, Results of conservative treatment of, 582; Of the male uro-genital tract, 396; Surgical, observations in its treatment by congestive hyperæmia, 479, 480.
- Tumors, Innocent and Malignant, Review of Sutton on, 120.
- U**RETER, Resection of vesical end of, for tumor of the bladder, 78; Surgery of the, 257; Transplantation of, into a vesical pouch, 183.
- Ureters, Chaput on the inosculation of, with the intestine, 193.
- Urinal for continuous drainage after suprapubic cystotomy, 371.
- Uro-genital tuberculosis in the male, 396.
- Uterus, Carcinoma of, Effect of ligation of both internal iliac arteries during hysterectomy for, 248.
- V**AN ARSDALE, W. W., Diagnosis of anthrax bacillus, 82; Epithelioma of nose and frontal sinus, 416; Treatment of intussusception, 421.
- VAN HARLINGEN, A., The marriage of syphilitics, 96.
- Veins, Treatment of varicose, 246.
- Vesico-vaginal fistula, operation from within the bladder for relief of, 392.
- W**HARTON, H. R., Treatment of strangulated hernia, 189; Treatment of contusions and sprains of the back, 192.
- WHITE, J. W., The marriage of syphilitics, 95.
- Wounds, Experimental investigations in the infection of, 470; disinfection of fresh, 471; Experimental studies in the treatment of infected, 472.
- WYETH, J. A., Results of operations for cancer, 75; Case of anthrax, 83; Operations on the spinal cord for the relief of paraplegia, 153, 184; Coccygeal tumors, 172; Treatment of obstructive prostatic enlargement, 173; Amputation of penis, 179.
- Y**OUNG'S Manual of Orthopædic Surgery, Review of, 648.

The only prominent Emulsion of Cod-Liver Oil introduced directly to the medical profession
It is advertised exclusively in medical journals.

HYDROLEINE.

(HYDRATED OIL.)

Produces rapid Increase in Flesh and Strength.

FORMULA.—Each Dose contains:			
Pure Cod Liver Oil.....80 m. (drops)	Soda.....1-2 Grains		
Distilled Water.....25 "	Salicylic Acid.....1-2 "		
Soluble Pancreatin.....5 Grains.			



Recommended and Prescribed by
EMINENT PHYSICIANS Everywhere.
It is pleasant to the Taste and
acceptable to the most delicate Stomach.

IT IS ECONOMICAL IN USE AND CERTAIN IN RESULTS.

HYDROLEINE (Hydrated Oil) is not a simple alkaline emulsion of oleum morrhuae, but a hydro-pancreated preparation, containing acids and a small percentage of soda. Pancreatin is the digestive principle of fatty foods, and in the soluble form here used, readily converts the oleaginous material into assimilable matter, a change so necessary to the reparative process in all wasting diseases.

The following are some of the diseases in which **HYDROLEINE** is indicated:

Phthisis, Tuberculosis, Catarrh, Cough, Scrofula, Chlorosis, General Debility, etc.

TO BRAIN WORKERS of all classes **HYDROLEINE** is invaluable, supplying as it does the true brain-food, and being more easily assimilated by the digestive organs than any other emulsion.

The principles upon which this discovery is based have been described in a treatise on "The Digestion and Assimilation of Fats in the Human Body," and "Consumption and Wasting Diseases," by two distinguished London physicians, which will be sent free on application. Sold by Druggists generally.

C. N. CRITTENTON, Sole Agent for the United States, 115 Fulton Street, N. Y.

^A Sample of Hydroleine will be sent free upon application to any physician (enclosing business card) in the U. S.

A POPULAR JOURNAL OF HEALTH.

THE ANNALS OF HYGIENE

(ISSUED MONTHLY.)

Contains valuable information for Architects, Plumbers, Undertakers, Builders, and all persons interested in

SANITARY MATTERS.

It also publishes the proceedings and papers of the State Board of Health of Pennsylvania.

Subscription - - \$2.00 per year.

Orders may be sent to any subscription agency or to the publishers,

UNIVERSITY OF PENNSYLVANIA PRESS,

716 Filbert Street, Philadelphia.

NERVES.

Suppose we find the patient a little giddy upon rising in the morning. This means that the nerves do not have perfect control of the muscular system. As a test for this, direct the patient to stand with his feet close together, shut his eyes, and if the tendency is to reel, it is another evidence of lowered nerve tone. Or, stand with the arms extended, shut the eyes, and then try to bring the tips of the forefingers together in front of him. • If they pass by or meet imperfectly, it shows the same thing.

This condition indicates the use of Celerina (Rio) in teaspoonful doses four times a day,
TO INCREASE THE NERVE CAPITAL OF YOUR PATIENT.

DYSPEPSIA.

Deranged digestion is the most common of all human ailments. It is a truism that no organ of the body can preserve its normal integrity *when its supplying nerve is disordered by lowered tone*, but this fact is largely ignored in these modern pepsin days—the *cause* being lost sight of whilst trying to remedy the effect. It is well known that any unusual worry or anxiety will upset the digestion of *the neurotic patient*. Hence in treating dyspepsia, particularly atonic dyspepsia, that form met with in persons of low vitality and poor appetite, there are *two distinct INDICATIONS*, one is to subserve the needs of general nutrition, the other is to subserve the needs of the nervous system. This can be done by giving the patient good nutritious food and a good nerve tonic. This explains why such remarkable results follow the daily use of *CELERINA* in all dyspeptic troubles.

A full size bottle of CELERINA will be sent
FREE to any Physician who wishes to test it,
if he will pay the express charges.

RIO CHEMICAL CO., St. Louis.

With Rubber Hands and Feet

are natural in action, noiseless in motion, and the most durable in construction.

Over 15,000 in use, scattered in all parts of the world. Eminent surgeons and competent judges commend the Rubber Foot and Hand for their many advantages. At every industrial exhibition where exhibited they have received the highest awards. They are endorsed and purchased by the United States and foreign governments. A treatise, containing 430 pages, with 300 illustrations, sent FREE; also a formula for taking measurements, by which limbs can be made and sent to all parts of the world with fit guaranteed.

Marks' Patent Artificial Limbs



To A. A. Marks:

DEAR SIR: I was a professional tight-rope walker and aeronaut before I lost my leg, and I do not allow the loss of a leg to compel me to seek another occupation. With your patent artificial leg I can walk a tight rope nearly as well as I ever could. The rubber foot enables me to balance with safety. The absence of an ankle-joint removes the risk of falling to a large degree.

While walking on the ground I never feel the necessity of looking for uneven or bad places. I feel safe and sure on my rubber foot, no matter where I place it. I consider your invention of the rubber foot the most valuable and important to persons who have lost their natural limbs than any invention that has been made.

If any person doubts my ability to walk on a tight rope with an artificial leg applied, I will wager \$100.00 with them that I can perform for 30 minutes on a one and one-half inch rope elevated fifty feet above the ground.

Resp'y yours,

Prof. F. E. JACOBY,

137 Bank St., Waterbury, Conn.



A. A. MARKS,
701 Broadway, N. Y. City

ESTABLISHED 1826.

GEORGE TIEMANN & CO.
SURGICAL INSTRUMENT MAKERS.
NEW YORK CITY.



JEWETT'S ASEPTIC OBSTETRICAL FORCEPS.

WANTED

Bright and Energetic Agents to
Canvass for our Magazines.

University Medical Magazine,
Annals of Surgery,
Annals of Hygiene,

UNIVERSITY OF PENNSYLVANIA PRESS,
716 Filbert Street, Philadelphia.



GLYCOZONE

Both Medal and Diploma
Awarded to Charles Marchand's Glycozone by World's Fair of Chicago, 1893, for its
Powerful Healing Properties.

This harmless remedy prevents fermentation of food in the stomach and it cures:
DYSPEPSIA, GASTRITIS, ULCER OF THE STOMACH, HEART-BURN, AND ALL INFECTIOUS DISEASES
OF THE ALIMENTARY TRACT.

HYDROZONE

IS THE STRONGEST ANTISEPTIC KNOWN.

One ounce of this new Remedy is, for its Bactericide Power, equivalent
to two ounces of Charles Marchand's Peroxide of Hydrogen (medicinal), which
obtained the Highest Award at the World's Fair of Chicago, 1893, for
Stability, Strength, Purity and Excellency.

CURES ALL DISEASES CAUSED BY GERMS.

Send for free 152-page book giving full information with endorsements of leading physicians.
Physicians remitting express charges will receive free samples.

GLYCOZONE is put up only in 4-oz., 8-oz.
and 16-oz. bottles bearing a yellow label,
white and black letters, red and blue border,
with signature.

HYDROZONE is put up only in small,
medium and large size bottles, bearing a red
label, white letters, gold and blue border.

☞ Mention this publication. Chemist and Graduate of the "Ecole Centrale des Arts et Manufactures de Paris" (France).

SOLD BY
LEADING DRUGGISTS. Charles Marchand

PREPARED
ONLY BY

Charles Marchand

28 Prince St., New York.



ETHYL CHLORIDE BENGUE

AN EFFECTIVE LOCAL ANÆSTHETIC.

Prepared by DR. BENGUE, Paris.

ETHYL CHLORIDE BENGUE is a pure haloid ether which evaporizes at an exceedingly low temperature (12.5° C.).
Its sprays anesthetizes by the intense cold of quick evaporation.

It has been used in Europe for years, in all branches of minor surgery with complete success. The use of
Ethyl Chloride is without danger of any kind; it can be applied equally to the skin and to mucous membranes.

It is exceedingly economical, as a bulb of 30 grammes is sufficient for at least ten anesthetizations. By means
of the tightly-fitting screw cap the bulb is sealed hermetically when not in use.

Price, \$1.00 per tube.

To the profession charges prepaid.

☞ Literature in reference to ETHYL CHLORIDE BENGUE will be sent on application.

ADDRESS

THOS. LEEMING & CO.,
73 Warren Street, New York.

Sole agents for the United States and Canada.

V

THE BEST ANTISEPTIC
FOR BOTH INTERNAL AND EXTERNAL USE.
LISTERINE.

Non-Toxic, Non-Irritant, Non-Escharotic—Absolutely Safe, Agreeable and Convenient.

FORMULA.—LISTERINE is the essential antiseptic constituent of Thyme, Eucalyptus, Baptisia, Gaultheria and Mentha Arvensis, in combination. Each fluid drachm also contains two grains of refined and purified Benzo-boracic Acid.

DOSE.—Internally: One teaspoonful three or more times a day (as indicated), either full strength, or diluted, as necessary for varied conditions.

LISTERINE is a well-proven antiseptic agent—an antizymotic—especially useful in the management of catarrhal conditions of the mucous membrane, adapted to internal use and to make and maintain surgical cleanliness—asepsis—in the treatment of all parts of the human body, whether by spray, injection, irrigation, atomization, inhalation, or simple local application, and therefore characterized by its particular adaptability to the field of

PREVENTIVE MEDICINE—INDIVIDUAL PROPHYLAXIS.

LISTERINE destroys promptly all odors emanating from diseased gums and teeth, and will be found of great value when taken internally, in teaspoonful doses, to control the fermentative eructations of dyspepsia, and to disinfect the mouth, throat and stomach. It is a perfect tooth and mouth wash,
INDISPENSABLE FOR THE DENTAL TOILET.

DISEASES OF THE URIC ACID DIATHESIS.

LAMBERT'S LITHIATED HYDRANGEA.

RENAL ALTERATIVE—ANTI-LITHIC.

FORMULA.—Each fluid drachm of "LITHIATED HYDRANGEA" represents thirty grains FRESH HYDRANGEA and three grains of CHEMICALLY PURE Benzo-Salicylate of Lithia. Prepared by our improved process of osmosis, it is INVARIABLY of DEFINITE and UNIFORM therapeutic strength, and hence can be depended upon in clinical practice.

DOSE.—One or two teaspoonfuls four times a day (preferably between meals.)

Close clinical observation has caused Lambert's Lithiated Hydrangea to be regarded by physicians generally as a very valuable Kidney Alterative and Anti-lithic agent in the treatment of

Urinary Calculus, Gout, Rheumatism, Cystitis, Diabetes, Hæmaturia, Bright's Disease, Albuminuria, and Vesical Irritations Generally.

REALIZING that in many of the diseases in which LAMBERT'S LITHIATED HYDRANGEA has been found to possess great therapeutic value, it is of the highest importance that suitable diet be employed, we have had prepared for the convenience of physicians

DIETETIC NOTES,

suggesting the articles of food to be allowed or prohibited in several of these diseases. A book of these Dietetic Notes, each note perforated and convenient for the physician to detach and distribute to patients, supplied upon request, together with literature fully descriptive of LISTERINE and LAMBERT'S LITHIATED HYDRANGEA.

LAMBERT PHARMACAL CO., St. Louis, U. S.

British, Canadian, French, Spanish, German and South American Trade Constantly Supplied.

Important Surgical Works.

A TEXT-BOOK OF ABDOMINAL SURGERY.

A Clinical Manual for Practitioners and Students.

By **Skene Keith, F.R.C.S.**
(Ed.), assisted by **George
E. Keith, M.B., C.M.**

35 Illustrations. 8vo. Cloth,
\$4.50; sheep, \$5.50.

The recent and rapid growth of the art of surgery as applied to the abdomen has made it necessary for us to systematize our knowledge of the art. This volume is intended to show the present state of our knowledge of abdominal surgery. In the belief that personal experience is of more value than elaborate compilation, the authors have preferred to draw upon their own experience and methods, especially since their experience is based on intimate professional relations with Dr. Thomas Keith, extending over a period of seventeen years.

Chapters are given on The General Examination of the Abdomen, Tapping, Aspiration, and Exploratory Incision. All the needed information on instruments and their uses is furnished, well supplemented by clear and helpful cuts; and the full treatment of operations, wounds, and the needs of the patient are dwelt upon at length. Each organ of the abdomen, male and female, is there described in its surgical relations with comprehensive detail, thus affording the student or practitioner a constant guide and an infallible companion in cases where practical experiments are out of reach.

WITH ESPECIAL REFERENCE TO GYNÆCOLOGICAL OPERATIONS, TOGETHER
WITH NOTES ON THE TECHNIQUE EMPLOYED IN CERTAIN SUPPLEMENTARY PROCEDURES.

In the light of recent scientific investigation, it seems clear that it is the province of bacteriology to pass judgment upon the usefulness or futility of any procedure advocated for the promotion of the speedy healing of wounds. The methods advised in this book have been tested by bacteriological experiment, so that they possess a definite known value. The author not only discusses the methods recommended by Schimmelbusch, Terrillon, and other prominent authors, but adds a number of modifications in technique, the utility of which he has himself seen demonstrated both in the laboratory and in practical operative work. The book will prove of great interest to the operative surgeon, on account of the minuteness of detail with which every step in an aseptic operation is discussed, and will set at rest the minds of many who are not able to control their own technique by bacteriological methods.

ASEPTIC SURGICAL TECHNIQUE:

By **Hunter Robb, M.D.,**

Associate in Gynæcology, Johns
Hopkins University; Professor
of Gynæcology, Western Re-
serve University, Cleve-
land, Ohio.

Illustrated. Crown 8vo. Cloth,
\$2.00.

A TREATISE ON APPENDICITIS.

By **George R. Fowler, M.D.,**

Examiner in Surgery, Medical
Examining Board of the Re-
gents of the University
of the State of New
York.

Illustrated. 8vo. Cloth. \$2.00.

The Table of Contents will at once show the scope of the work, as follows: Anatomical Considerations; The Inflammatory Lesions of the Appendix; Acute Appendicitis, Clinical History; Special Types of Appendicitis; Complications and Sequelæ of Appendicitis; The Etiology of Appendicitis; Bacteriological Considerations; The Pathological Anatomy of the Appendix Vermiformis; The Diagnosis of Appendicitis; The Prognosis of Appendicitis; The Treatment of Appendicitis; General Considerations: The Operative Treatment; The After Treatment.

Within a comparatively brief period the disease originating in the vermiform appendix, known as appendicitis, has commanded an unusual attention in the world of surgery and has yielded operative results of a very satisfactory nature. The ailment is of so acute an order and leaves so little time for restoration or surgical treatment that its character has not until a comparatively recent date been fully investigated. Dr. Fowler's work is of a most thorough and detailed character, and well equips the student or surgeon inexperienced in the latest devices for treating appendicitis with knowledge the most general and the most particular. Many plates illustrating the appendix and the operations occasioned by it accompany the text.

J. B. LIPPINCOTT COMPANY, PUBLISHERS,

715 and 717 Market Street, Philadelphia.

SEASONABLE SUGGESTIONS.

With the opening of the winter season, and its attendant bronchial and pulmonary troubles, we are having from many sections reports of a recurrence of La Grippe epidemic, which for the past six or seven years has afflicted the country.

This fact makes particularly pertinent a recalling of the salient points of Dr. V. W. GAYLE's paper first published in the *Medical World* in the midst of La Grippe's most malignant visit. It will be well to note closely his recommendations and experience in connection with the recurrence of the epidemic which is now apparently upon us. He says: "This disease by proper treatment of an attack can be so modified as to be almost aborted. If not properly managed, influenza is particularly liable to grave complications, even in mild cases the tendency is towards prostration, and often the nervous shock is such as to materially debilitate the patient. Where there is much angina with acute bronchial irritation, the following is indicated:

R Ammon. Chloridi ij
 Potassii Chloras ℥ss
 Tinct. Ferri. Chloridi ℥ss
 Syr. Simplex ℥ss
 Aquæ q. s. ft. ℥iv M.

Sig.—Teaspoonful in sweetened water every four hours,
 also apply to the throat with probang every three hours.

Quinine is the best germ-destroyer we have for the microbe of influenza. During the recent epidemic I aborted quite a number of cases with antikamnia and quinine in combination; also with antikamnia and salol. The relief obtained by the administration of antikamnia alone, where the cephalalgia was severe, as in the majority of my cases, was wonderful. When the pain seemed almost intolerable I have seen a ten-grain dose banish it.

Mustard pediluvia are of great advantage, and a plaster of mustard and lard, one part of the former to two of the latter, applied directly to the chest, answered admirably as a mild counter-irritant.

Expectorants are often needed, and antikamnia should be administered with them, thus:

R Antikamnia (genuine) 3 j
 Syr. Senega 3 j
 Vini Ipecac 3 ij
 Syr. Tolutan q. s. ft. 3 iv

Mix and let stand until effervescence ceases.

Sig.—Teaspoonful every two hours.

The mild chloride of mercury in minimum doses often repeated will be beneficial. The following prescription is a favorite of mine:

R Hydrarg. Chlo. Mit. gr. j
 Sodii Bicarb. ʒ i
 Lactopeptine (genuine) 3 ss

M. ft. chart No. x.

Sig.—One every hour until all are taken, followed by a full dose of Hunyadi janos water.

"Antikamnia and Quinine Tablets," containing $2\frac{1}{2}$ grains each of antikamnia and quinine, also "Antikamnia and Salol Tablets," containing $2\frac{1}{2}$ grains each of antikamnia and salol, offer the best vehicle for exhibiting these combinations, giving one every two or three hours.

Gayle concludes his paper as follows: "What is mostly needed is an anti-thermic analgesic to relieve the pain and reduce the fever. These properties are found in antikamnia. This with the germ-destroyer quinine is all that is really needed in the treatment of this disease. I advocate the use of stimulants in nearly every case. They are frequently needed in the onset of the disease. Sprays of carbolic acid, turpentine, or resorcin are frequently efficacious in the laryngeal troubles. The diet should be light and easily digestible. By careful attention and avoidance of exposure, together with the line of treatment mapped out, the vast majority of cases will recover. Of course, there are occasional cases which present symptoms which require other remedial agents, but these of necessity must be left to the discretion of the medical attendant."

SYR. HYPOPHOS. CO., FELLOWS

Contains the Essential Elements of the Animal Organization—Potash and Lime ;

The Oxidising Agents—Iron and Manganese ;

The Tonics—Quinine and Strychnine ;

And the Vitalizing Constituent—Phosphorus ; the whole combined in the form of a Syrup with a **Slightly Alkaline Reaction.**

It Differs in its Effects from all Analogous Preparations ; and it possesses the important properties of being pleasant to the taste, easily borne by the stomach, and harmless under prolonged use.

It has Gained a Wide Reputation, particularly in the treatment of Pulmonary Tuberculosis, Chronic Bronchitis, and other affections of the respiratory organs. It has also been employed with much success in various nervous and debilitating diseases.

Its Curative Power is largely attributable to its stimulant, tonic, and nutritive properties, by means of which the energy of the system is recruited.

Its Action is Prompt ; it stimulates the appetite and the digestion, it promotes assimilation, and it enters directly into the circulation with the food products.

The prescribed dose produces a feeling of buoyancy, and removes depression and melancholy ; *hence the preparation is of great value in the treatment of mental and nervous affections.* From the fact, also, that it exerts a double tonic influence, and induces a healthy flow of the secretions, its use is indicated in a wide range of diseases.

NOTICE—CAUTION.

The success of Fellows' Syrup of Hypophosphites has tempted certain persons to offer imitations of it for sale. Mr. Fellows, who has examined samples of several of these, **finds that no two of them are identical,** and that all of them differ from the original in composition, in freedom from acid reaction, in susceptibility to the effects of oxygen when exposed to light or heat, **in the property of retaining the strychnine in solution,** and in the medicinal effects.

As these cheap and inefficient substitutes are frequently dispensed instead of the genuine preparation, physicians are earnestly requested, when prescribing the Syrup, to write "**Syr. Hypophos. Fellows.**"

As a further precaution, it is advisable that the Syrup should be ordered in the original bottles ; the distinguishing marks which the bottles (and the wrappers surrounding them) bear, can then be examined, and the genuineness—or otherwise—of the contents thereby proved.

Medical letters may be addressed to

MR. FELLOWS, 48 Vesey Street, New York.

ANNALS OF SURGERY

MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE

EDITED BY

A. S. FOLCHER, A.M., M.D.,

OF BROOKLYN.

J. WILLIAM WHITE, M.D.,

OF PHILADELPHIA.

FREDERICK TREVES, F.R.C.S.,

OF LONDON.

WILLIAM MACEWEN, M.D.,

OF GLASGOW.

TABLE OF CONTENTS.

ORIGINAL MEMOIRS.

- I. *Incisive Procedures in Congenital and Traumatic Dislocations of the Hip in Children.* By *F. P. Gibney, M.D.* . . . 621
- II. *Resection of the Ileo-Cecal Coil of the Intestine; Its Indications, Results, and Modus Operandi, with a Review of the Reported Cases and two heretofore Unpublished.* By *William S. McGill, M.D.* . . . 642
- III. *Ether Anesthesia: Clinical Notes on 300 Cases.* By *G. Gordon Campbell, M.D.* . . . 676
- IV. *Extra-Uterine Pregnancy and Pelvic Hemorrhage: Cases and Remarks.* By *Maurice H. Richardson, M.D.* . . . 705
- V. *A Case of Horseshoe Kidney.* By *Richard Bertlett Olson, M.D.* . . . 731

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

- Stated Meeting, October 10, 1894. *Stricture of the Oesophagus Successfully Divided with a String (Abbe's Method) after Gastrostomy:* *Murray, 735.*
- Operative Procedures in Congenital and Traumatic Dislocations of the Hip in Children:* *Gibney, 736.*
- Two Cases of Successful Splenectomy:* *Markee, 737.*
- Pyloroplasty for Gastric Stenosis:* *Markee, 740.*
- Gastrocho-Lithotomy:* *Markee, 741.*

EDITORIAL ARTICLES.

- I. *Hoffa on the Pathological Anatomy of Scoliosis* . . . 741

REVIEW OF BOOKS.

- Young: A Manual of Orthopaedic Surgery, for Students and Practitioners.* . . . 746
- Fowler: A Treatise on Appendicitis.* . . . 751

PUBLISHED MONTHLY BY

UNIVERSITY OF PENNSYLVANIA PRESS,
PHILADELPHIA, PA.

1894.

Great Britain: Cassell and Company, London.

PRINTED BY J. B. LIPPINCOTT CO., PHILADELPHIA.

\$5.00 a Year in Advance.

Single Number, 50 Cents.

One Guinea a Year in Advance.

Single Copies, Two Shillings.

Sent at the Post-Office at Philadelphia, and admitted for transmission through the mail at special rate.

Copyright 1894 by University of Pennsylvania Press.

FEHR'S **SKIN AND TISSUE BODY POWDER**

"COSMETIC SURGICAL POWDER"
FOR INFANTS AND ADULTS

Analyzed and its Therapeutic Properties Discussed
 in 1888, by Dr. FEHR, and introduced to the
 Medical and the Pharmaceutical Professions
 in the year 1873.

Composition.—Silicate of Magnesia with
 Glycerin and Salicylic Acid.

Properties.—Antiseptic, Antizymotic and
 Disinfectant.

Used as a General Sprinkling Powder,
 with positive Hygienic, Prophylactic and
 Therapeutic Properties.

USEFUL IN ALL AFFECTIONS OF THE SKIN.

MADE BY THE DRUG TRADE GENERALLY.

For Sale plain, 25 cents; Perfumed, 30 cents.
 For Sale " 25-75 " " 42-50

THE MANUFACTURER:
JULIUS FEHR, M.D.

ANCIENT PHARMACIST.
 Established 1839. Hoboken, N. J.
 Sole Dispensed in Medical and Pharmaceutical Stores



UNIVERSITY **MEDICAL MAGAZINE**

Edited under the Auspices
 of the Alumni and Faculty of Medicine of the
 University of Pennsylvania.

EDITORIAL STAFF:
Advisory Committee:
 WILLIAM PROVER, M.D., JAMES TYSON, M.D.,
 WILLIAM GOODELL, M.D., J. WILLIAM WHITE, M.D.,
 EDWARD C. WOOD, M.D., MARTON COOKER REESE, M.D.,
 CHARLES D. MERRITT, M.D., EUGENE JAYNE, M.D.
Editorial Committee:
 EDWARD C. WOOD, M.D., A. A. STIVERS, M.D.

PUBLISHED MONTHLY.
SUBSCRIPTIONS MAY BEGIN AT ANY TIME.
\$2.00 PER YEAR.

Send for free on application to the Publishers,
UNIVERSITY OF PENNSYLVANIA PRESS,
 116 FILBERT STREET, PHILADELPHIA.

